From: Brian Renninger [mailto:BrianR@pscleanair.org]
To: Luce, Chuck
Sent: 2008, 07.30 Wed, 23:06:35
Subject: Clean Air Agency Response

Attachments:

Chuck,

I have some questions regarding the source test plan. Please forward these to AMTEST for their response.

1. The report mentions "preheater exhaust". Is this another combustion unit or the portion of recirculated gases exhausted as part of the regenerative burner system? If another combustion source please provide more details as this unit was not reviewed as part of the NOC application.

2. The section on Exhaust Gas Flow Determination mentions the "Jorgensen Forge will need to provide ATAQ natural gas usage rates during each run (in scf/hr), the heat content of the fuel (in Btu/scf), and a fuel factor (in scf/MMBtu). If Jorgensen Forge provides an ultimate analysis of the fuel, ATAQ can calculate the fuel factor using the mole fractions of each component of the fuel. If no ultimate analysis of the fuel is provided, ATAQ will use the standard F-factors listed in EPA Method 19 for the fuel which is similar to the fuel being fired." Jorgensen Forge and AMTEST need to determine what data will be provided prior to the source test and include it in the test plan. Note that agency Regulation I, Section 3.07(c)(5) requires that the source test report include the amount of fuel burned and raw material processed. This is the minimum data the source test report should include but more data may be needed if necessary for an accurate test. It should be determined if Jorgensen Forge will be providing an Ultimate Fuel Analysis as part of the test plan.

3. Please discuss how the use of Method 19 F-factors versus an ultimate analysis of the fuel derived fuel factors, or measured exhaust flows may influence the test results.

4. In order to determine the mass emission rates it seems like either the flow needs to be measured at each stack or flows can be calculated theoretically using EPA method 19 f-factors. However, to determine each stacks contribution using the Method 19 F-factors the fuel flow to each burner is needed as well as any fuel used by the "preheater" mentioned in the report. If the "preheater" unit does not combust fuel then please describe in more details how flows will be determined for that stack as fuel flow and F-factors alone won't be sufficient to estimate flow from that stack. Please provide more details as to what fuel flows will be measured.

5. Please provide the details of calculations showing how the concentrations from the multiple emission points will be combined to a single concentration for comparison to the emission limit set in condition 3 of the permit.

6. Please discuss other openings of the furnace such as the entry and exit points for billets that heated and how emissions (if any) from these locations will be accounted for.

Sincerely,

Brian Renninger
Engineer
Puget Sound Clean Air Agency

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"Working together for clean air"
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From: Luce, Chuck [mailto:cluce@JorgensenForge.com]
Sent: Wednesday, July 30, 2008 9:27 AM
To: Brian Renninger
Cc: Desberg,Wayne
Subject: FW: Proposed Test Plan

Brian;

Here is our test plan proposed for the new furnace F-11. Upon reviewing, if there are any questions or problems, please give me a call.

Regards,

Chuck Luce
Jorgensen Forge
Cell No. 206-730-2607
Office No. 206-357-1078

ICAC Test Method
For Periodic Monitoring

Test Method - Determination of Oxygen, Carbon Monoxide and

Oxides of Nitrogen from Stationary Sources

For Periodic Monitoring

(Portable Electrochemical Analyzer Procedure)

1. APPLICABILITY AND PRINCIPLE

1.1 Applicability. This method is applicable to the determination of nitrogen oxides (NO and NO_2), carbon monoxide (CO) and oxygen (O_2) concentrations in controlled and uncontrolled emissions from combustion sources using fuels such as natural gas, propane, butane, and fuel oils. This method is designed to provide a reasonable assurance of compliance using periodic monitoring or testing. This method is not intended for use where an EPA reference test method is required. Due to inherent cross sensitivities of electrochemical (EC) cells, this method should not be applied to other pollutants or emission sources without a complete investigation of possible analytical interferences and a comparative evaluation with other EPA test methods.

1.2 Principle. A gas sample is extracted from a stack and is conveyed to a portable EC analyzer for determination of NO, NO_2, CO and O_2 gas concentrations. Analyzer performance specifications and test procedures are provided to ensure reliable data. Additions to, or modifications of, vendor supplied analyzers (e. g. heated sample lines, thermocouples, flow meters, etc.) may be required to meet the design specifications of this test method. Changes that diminish the analyzer from the as-verified (see Definitions, Section 3.15) configuration are not permitted.

2. RANGE AND SENSITIVITY

2.1 Analytical Range. The instrument and EC cell design will determine the analytical range for each gas component. The nominal range is defined by choosing a span gas concentration near the maximum anticipated flue gas concentration for that constituent or near the permitted level as determined by the appropriate regulatory agency.

2.1.1 NO, NO_2 and CO Span Gases. Choose a span gas concentration such that the average stack gas reading for each test run is between 25 and 150 percent of the span gas concentration. Alternatively, choose the span gas such that it does not exceed twice the concentration equivalent to the permitted level. If the actual emissions exceed 150 percent of the span gas value at any time during the sampling run, the test run for that channel shall be invalid. The NO_2 span gas concentration should be selected at a level within the NO_2 sensor's measuring range, but for span gas stability and availbility considerations, above 75 ppm (in a base of air)is acceptable.

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September 8, 1999

2.1.2 O_2 Span Gas. The difference between the span gas concentration and the average stack gas reading for each sample run shall be less than 15% O_2. Where the stack oxygen readings are above 6%, dry ambient air (20.9% O_2) may be used for the span gas. Oxygen readings below 6% should be verified with low concentration calibration gas.

2.2 Sensitivity Range. The minimum detectable limit depends on the nominal range and resolution of the electrochemical cell and signal to noise ratio of the measurement system. The minimum detectable limit should be 2 percent of the nominal range or 1 ppm, whichever is less restrictive.

3. DEFINITIONS

3.1 Measurement System. The total equipment required for the determination of gas species concentrations. The measurement system consists of the following major subsystems:

3.1.1 Sample Interface. The portion of a system used for one or more of the following: sample acquisition, sample transport, sample conditioning or protection of the analyzer from the effects of the stack effluent, particulate matter and condensed moisture.

3.1.2 Interference Gas Scrubber. A device used to remove or neutralize compounds likely to interfere with the selective operation of the cell.

3.1.3 Electrochemical Cell. A device, similar to a fuel cell, that senses a specific gas and generates a current output proportional to the gas concentration.

3.1.4 Moisture Removal System. Any device used to reduce the concentration of moisture in the sample stream for protecting the EC cells from the damaging effects of condensation and for minimizing errors in readings caused by the scrubbing of soluble gases.

3.1.5 Data Recorder. A strip chart recorder, computer or digital recorder for logging measurement data from the analyzer output. The digital data display may be used when taking manual measurements.

3.2 Nominal Range. The range of concentrations over which each cell is operated (25% to 150% of span gas value). Several nominal ranges may be used for any given cell as long as the calibration and repeatability check for that range remains within specification.

3.3 Span Gas. A known concentration of a gas in an appropriate diluent gas.

3.4 Zero Calibration Error. The gas concentration output exhibited by the gas analyzer in response to zero-level calibration gas.

3.5 Span Calibration Error. The difference between the gas concentration exhibited by the gas analyzer and the known concentration of the span gas.

3.6 Interference Check. A method of quantifying analytical interference from components in the stack gases other than the targeted analyte.

3.7 Repeatability Check. A method of demonstrating that an EC operated over a given nominal range provides a stable and consistent response and is not significantly affected by repeated exposure to the targeted analyte.

3.8 Response Time. The amount of time required for the measurement system to display 95 percent of a step change in gas concentration.

3.9 Initial EC Cell Temperature. The temperature of the EC cells recorded during the most recent pretest calibration check.

3.10 Sample Flow Rate. The flow rate of the gas sample through the analyzer. In some situations, EC cells can experience drift with the changes in flow rate. The flow rate must be monitored during calibration and testing.

3.11 Measurement Cycle. A timed three-phase cycle whereby an analyzer's response rises through a ramp-up phase followed by a stable test data collection phase then purged of the gas sample during a refresh phase. The "Ramp-up Phase" exposes the analyzer to the gas sample for 5 minutes ($t_0 - t_5$). The "Test Data Phase" is the time of the stabilized gas sample measurements ($t_5 - t_7$) with recordings starting at $t_{5:15}$. The "Refresh Phase" is the timed process where the EC cells are purged or flushed with fresh air ($t_7 - t_{15}$). The refresh phase replenishes requisite O_2 and moisture in the electrolyte reserve and provides a mechanism to de-gas (desorption) the interference gas scrubbers and filters to ensure a stable and accurate EC cell response. A diagram of this measurement cycle is shown in Figure 1A. Measurement cycles can be coupled together for evaluations lasting hours providing all other test method specifications are met. Measurement cycles may deviate from those recommended in this protocol if they are approved by the applicable regulatory agency.

3.12 Test Day. A time not to exceed twelve hours from the time of the pre-test verification to the post-test verification. During this time, testing may occur without further need of calibration providing all other testing specifications have been met.

3.13 Pre-Test/Post-Test Verification. The procedure executed at the beginning and end of each test day to bracket test readings with a controlled performance assurance test.

3.14 NO_x Measurement. If the NO_2 percentage of NO_x is less than 10 percent, you may either measure NO_2 or estimate total NO_x by adding to the NO measurement that amount representing the estimated percentage of NO_2. Historical values may be used to establish the percent of NO_2 provided the determination of NO_2 was based on a stack test. Direct measurement of NO_2 shall be required if the NO_2 percentage is greater than 10 percent of the total NO_X.

3.15 "As-verified". Refers to the analyzer and sampling system configuration as was tested by independent third party organizations (i.e. EPA ETV, SCAQMD, TUV or equivalent).

4. MEASUREMENT SYSTEM PERFORMANCE SPECIFICATIONS

4.1 Zero Calibration Error. The zero level output shall be less than or equal to ± 3 percent of the span gas value or ± 1 ppm, whichever is less restrictive, for the NO, NO_2 and CO channels and less than or equal to ± 0.3 percent O_2 for the O_2 channel (see Section 6.2.1 for zero calibration procedure).

4.2 Span Calibration Error. The average calculated "test data phase" error shall be less than or equal to ± 5 percent of the span gas value or ± 1 ppm, whichever is less restrictive, for the NO, NO_2, CO and O_2 channels. The maximum allowable deviation of any single "test data phase" reading shall be less than or equal to ± 2 percent or 1ppm, whichever is less restrictive, of the average (see Section 6.2.2 for span calibration procedure).

4.3 Interference Response. The CO, NO, and NO_2 interference response must be less than or equal to ± 5 percent of the span gas concentration. Analyzers that have been verified for interference response by a recognized agency (Section 5.1.10) shall be considered in compliance with this interference check specification. The potential for interference from other flue gas constituents should be reviewed with the analyzer manufacturer based on site-specific data (see Section 6.3 for interference response procedure).

4.4 Repeatability Check Response. The calculated average of the "test data phase" for the NO, NO_2 and CO span gases shall not vary more than ± 3 percent or ± 1 ppm, whichever is less restrictive, of the span gas value over four measurement cycles (see Section 6.4 for repeatability check procedure).

5. APPARATUS AND REAGENTS

5.1 Measurement System. Use any measurement system that meets the performance and design specifications in Sections 4 and 5 of this method. The sampling system shall maintain the gas sample at conditions that will prevent condensation in the lines or when it contacts the EC cells. A diagram of an acceptable measurement system is shown in Figure 2. The essential components of the measurement system are described below.

5.1.1 Sample Probe. Glass, stainless steel or other non-reactive material of sufficient length to traverse the sample points. The sample probe shall be designed to prevent condensation.

5.1.2 Sample Line. Non-reactive tubing designed to transport the effluent from the sample probe to the moisture removal system. The sample line shall be designed to prevent condensation.

5.1.3 Sample Transport Lines. Non-reactive tubing to transport the sample from the moisture removal system to the electrochemical cell.

5.1.4 Calibration Assembly. A three-way valve assembly, tee or equivalent for introducing calibration gases at ambient pressure to the sample probe during calibration checks. The assembly shall be designed such that only calibration gas is processed and that calibration gases flow through all gas path filters.

5.1.5 Moisture Removal System. A chilled condenser or similar device to remove condensate continuously from the sample gas while maintaining minimal contact between the condensate and the sample gas shall be required if the NO_2 portion of NO_x is greater than 10 percent. Alternatively, for gas streams with less than 10 percent NO_2, a device that uses ambient means to condense moisture from the gas stream before the EC cells is acceptable for this method.

5.1.6 Particulate Filter. Filters before the inlet of the analyzer may be used to prevent accumulation of particulate material in the measurement system and extend the useful life of the components. All filters shall be fabricated of materials that are non-reactive to the gas being sampled.

5.1.7 Sample Pump. A leak-free pump that will provide the sample gas to the system at a flow rate sufficient to minimize the response time of the measurement system. If upstream of the EC cells, the pump shall be constructed of any material that is non-reactive to the gas being sampled.

5.1.8 Sample Flow Rate Monitoring. A rotameter or equivalent device must be used to measure the sample flow rate through the analyzer such that either:

1. The analyzer sample flow rate must not vary by more than ± 10% throughout the pre-test & post-test verification calibrations and source measurement cycles, or
2. The analyzer sample flow rate must be maintained within a tolerance range that does not affect the gas concentration readings by more than ± 3%. This flow rate tolerance range must be as-verified or

certified by the analyzer manufacturer. (Appendix B)

5.1.9 Sample Gas Manifold. A manifold used to divert a portion of the sample gas stream to the analyzer and the remainder to the by-pass discharge vent. This is to be used on high pressure exhaust streams to prevent damage to the measurement system and to avoid false readings. The sample gas manifold should also include provisions for introducing calibration gases directly to the analyzer. The manifold may be constructed of any material that is non-reactive to the gas being sampled.

5.1.10 Gas Analyzer. A device containing EC cells to determine the NO, NO_2, CO and O_2 concentrations in the sample gas stream and, if necessary, to correct for interference effects. The analyzer shall meet the applicable performance specifications of Section 4 and 5 of this method. It is recommended that the analyzer shall be verified for NO_x measurements by a recognized testing agency (e.g. ETV, SCAQMD or TUV) or as approved by EPA Method 301 verification.

5.1.11 Data Recorder. A strip chart recorder, computer or digital recorder for logging analyzer output data. The data recorder resolution (i. e. readability) shall be at least 1 ppm for CO, NO and NO_2; 0.1% for O_2; and one degree (C or F) for temperature. Alternatively, a digital or analog meter having the same resolution may be used to obtain the analyzer responses and the readings may be recorded manually.

5.1.12 Interference Gas Scrubber. A device used by some analyzers to remove interfering compounds upstream of a CO electrochemical cell. If external interference gas scrubbers are required in the original as-verified configuration, they must be used with this protocol. The gas scrubber should have a means to determine when the agent is exhausted. The scrubbing agent shall be changed in accordance with the manufacturer's recommendations.

5.1.13 EC Cell Temperature Indicator. The analyzer shall be equipped with a temperature measurement device (e.g. thermocouple, thermistor or equivalent) to monitor the EC cell temperature. The temperature may be monitored at the surface, within the cell, or in close proximity to the cells such that it indicates the operating temperature of the cells. At no time shall the analyzer be used outside the manufacturer's recommended operating range.

5.2 Calibration Gases. The calibration gases for the gas analyzer shall be CO in nitrogen or CO in nitrogen and O_2, NO in nitrogen, NO_2 in air and O_2 in nitrogen. Clean, dry air (20.9 percent O_2) may be used for calibration of the O_2 cell.

5.2.1 Span Gases. Used for calibration and error checking. Select concentrations according to procedures specified in Section 2.

5.2.2 Zero Gas. Concentration of less than 0.25 percent of the span gas for each component. Fresh air, free from ambient CO and NOx or other combustion gases, may be used.

6. MEASUREMENT SYSTEM PERFORMANCE CHECK PROCEDURES

The following procedures define the process to follow in order to verify analyzer performance and accuracy during the test day measurement cycles.

6.1 Calibration Gas Concentration Verification. For the span gases, use certified calibration gases. For O_2 calibration and CO and NO_x zero gas, fresh air, free from ambient CO and NO_x shall be permitted. Alternative certification techniques may be used if they are approved in writing by the applicable regulatory agency.

6.2 Pre-Test Verification (Calibration). Conduct the following procedure once for each nominal range that is to be used on each EC cell before taking test data during the field test day. Repeat the calibration check if a cell is replaced. There is no prescribed order that the EC cells must be calibrated in. However, each cell must complete the measurement cycle during the calibration check. Assemble the measurement system by following the manufacturer's recommended procedures for preparing and preconditioning the gas analyzer. Assure the system has no leaks and verify the gas scrubbing agent is not depleted.

6.2.1 Zero Calibration Check Procedure. Calibrate the O_2 EC cell at 20.9 percent using fresh air. For the O_2, CO, NO and NO_2 EC cells introduce the zero gas and record the reading. Include the time, EC cell temperature, and sample flow rate on a form similar to Figure 3 (see Section 4.1 for specifications).

6.2.2 Span Calibration Check Procedure. Individually inject each span gas into the analyzer and record the zero start time (t_0). Record all analyzer output responses, the EC cell temperature, and the flow rate during this “ramp-up phase” once per minute for the first 5 minutes. At 5 minutes (t_5) begin the “test data phase” and record readings every 15 seconds for a total of two minutes ($t_{5:15} – t_7$) or as required by permit conditions. The “refresh phase” will be performed for the next eight minutes ($t_7 – t_{15}$) with fresh air, free from CO, NOx and other pollutants. Record data every minute. Repeat the steps in Section 6.2.2 to verify the calibration for each component gas. Gases shall be injected through the entire sample handling system.

6.2.3 Calibration Check Calculation. Calculate mean average of the readings from the “test data phase” (t_5 - t_7). The acceptable mean average is within ± 5 percent of the span gas concentration and the maximum deviation from the average for each of the individual readings ($t_{5:15} – t_7$) is less than or equal to ±

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September 8, 1999

2 percent. Record the average value and maximum deviation for each species monitored. Data shall conform to Section 4.2. If an invalid calibration is exhibited, take corrective action and repeat the analyzer calibration check until acceptable performance is achieved (see Figure 1B). The flow rate and EC cell temperature shall conform to the specifications in Section 5.1.8 and 5.1.13, respectively.

<u>Example</u>: If the span gas value is 100 ppm, the average of the readings for that parameter may be within ±5 ppm of 100 ppm, i.e. 95 to 105 ppm. The test cycle is invalid if the maximum deviation of any single reading comprising that average is greater than ±2% or 2 ppm (i.e. average = 102 ppm; single readings of below 100 ppm and above 104 ppm are disallowed).

6.3 Interference Check. During the calibration check of a single gas species (e.g. CO), record the response displayed by the other EC cells (i.e. NO & NO_2). Record the interference response for each EC cell to each calibration gas. The interference will conform to the specifications in Section 4.3.

6.4 Repeatability Check. Conduct the following procedure once for each nominal range that is to be used on each electrochemical cell (NO, NO_2 and CO) within five days prior to each field test program. If a field-test program lasts longer than five days, this procedure shall be performed before each five days of analyzer operation. Perform the repeatability check if a cell is replaced or if a cell is exposed to gas concentrations greater than 150 percent of the highest span gas concentration.

6.4.1 Repeatability Check Procedures. Perform a measurement cycle by injecting the span gas into the analyzer and record the readings. Follow Section 6.2.2 procedures. Record the readings on a form similar to the one found in Figure 3. Repeat the measurements for a total of four cycles. During the repeatability checks, do not adjust the system except where necessary to achieve the correct calibration gas flow rate at the analyzer.

6.4.2 Repeatability Check Calculations. Determine the highest and lowest average "test data phase" concentration recorded from the repeatability check and record the results on a form similar to Figure 3. The absolute value of the difference between the maximum and minimum average values recorded during the test must not vary more than ± 3 percent or 1 ppm whichever is less restrictive of the span gas concentration results (see Figure 1C).

6.5 Post-Test Verification (Calibration). Perform the post-test verification calibration check in the same manner as shown in Section 6.2 of this method at the end of each test day. If the post-test verification calibration checks do not meet the specifications, all test data for that component, based upon that test day calibration are null and void and re-calibration and re-testing is required. Make no changes to the sampling system or analyzer calibration until all of the post-test verification checks have been recorded.

7. EMISSION TEST PROCEDURE

7.1 Selection of Sampling Site and Sampling Points.

7.1.1 Reciprocating Engines. Select a sampling site located at least two stack diameters downstream of any disturbance (e.g. turbocharger exhaust, crossover junction or recirculation take-off) and one-half stack diameter upstream of the gas discharge to the atmosphere. Use a sampling location at a single point near the center of the duct or use the point required by the local regulator.

7.1.2 Combustion Turbines. Select a sampling site and sample points according to the procedures in 40 CFR, Part 60, Appendix A, Method 20. An alternative sampling location and/or sample from a single point in the center of the duct may be used if previous test data demonstrate that the stack gas concentrations of CO, NO_x and O_2 do not vary significantly across the duct diameter. Use of the point required by the local regulator is also acceptable.

7.1.3 Process Boilers. Select a sampling site located at least two stack diameters downstream of any disturbance and one-half stack diameter upstream of the gas discharge to atmosphere. Use a sampling location at a single point near the center of the duct or use the point required by the local regulator.

7.2 Sample Collection. Prior to sample collection, ensure that the pre-test verification has been performed in accordance with Section 6.2. Zero the analyzer with fresh air. Position the probe at the first sampling point and begin the measurement cycle at the same flow rate used during the calibration check. Begin the 5-minute "ramp-up phase" (t_0 - t_5). Record the gas sample readings, sample flow rate and EC cell temperature on a form similar to Figure 3. The "test data phase" runs for two minutes ($t_5 – t_7$). Record the readings at 15-second intervals beginning at $t_{5:15}$. The "refresh phase" begins at t_7 and runs for 8 minutes (t_7 to t_{15}) or until the analyzer has "refreshed" in accordance with the manufacturer's specification. Record the readings. For each run use the "test data phase" measurements to calculate the average effluent concentration.

7.3 EC Cell Temperature and Flow Monitoring. For each measurement cycle, the temperature measurement of the EC cells shall not vary more than ± 10^0F. The overall EC cell temperature variation shall be less than ± 20^0F from the pre-test verification check to the final post-test verification check. The sample flow rate shall be in accordance with Section 5.1.8.

7.4 Post-Test Verification Check. Conduct the post-test verification check after the test run or set of test runs and within 12 hours of the initial calibration check. Conduct span and zero calibration checks using the procedure in Section 6.2. Make no changes to the sampling system or analyzer calibration until all post-test verification checks have been recorded. If the zero or span calibration error exceeds the specification in Sections 4.1 and 4.2 then all test data collected since the previous successful calibration checks are invalid and re-calibration and re-testing is required. If the sampling system is disassembled or the analyzer calibration is adjusted, repeat the calibration check before conducting the next source test.

8. EMISSION CALCULATION

The average gas effluent concentration is determined from the mean average gas concentration calculated using the emissions data collected during the "test data phase". Emissions may be calculated and reported in units of the allowable emission limit as specified in the permit or as required by the local agency for purposes of facility compliance. The emissions may be stated in units of pounds per hour (lbs/hr), grams per horsepower-hour (gm/hp-hr), pounds per million Btu (lbs/MMBtu) or as required for the facility. Appendix A provides example test result forms with emission rate calculations, f-factors, and the flow rate certification procedure for analyzer manufactures. Alternately, EPA Reference Method 19 may also be used as the basis for calculating the emissions and EPA Reference Methods 1-4 may be used to obtain a stack volumetric flow rate.

BIBLIOGRAPHY

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3. "State of Wyoming Air Quality Division Portable Analyzer Monitoring Protocol", Wyoming Department of Environmental Quality, Air Quality Division, January 1999.

4. "Product Data Handbook" Issue 3.0, Volume II: Emissions, City Technology Ltd., December 1996.

5. "Code of Federal Regulations", Protection of Environment, 40 CFR, Part 60, Appendix A, Methods, 1-4, 19, 20.

FIGURES

FIGURES - 1A, 1B, 1C

Figure 1A - Measurement Cycle, 15 Min. (For calibration and source measurements)

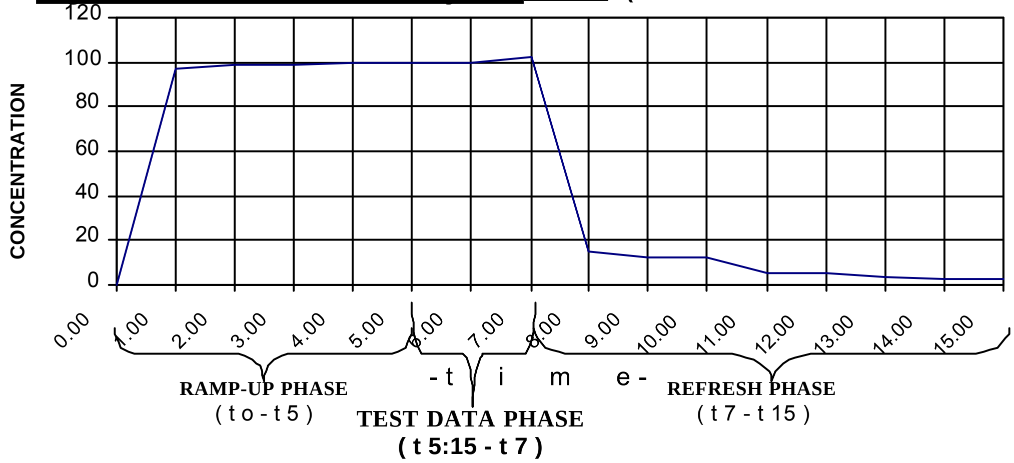

Figure 1B - Span Calibration (For span calibration only)

Span Calibration Error - The calculated "TEST DATA PHASE" average shall be less than ± 5% of the span or ± 1 ppm whichever is less restrictive for NO, NO2, CO and O2. The **Maximum Allowable Deviation** of any single "test data phase" reading shall be ± 2% or 1 ppm. Whichever is less restrictive, of the average. (The example below does not meet this specification)

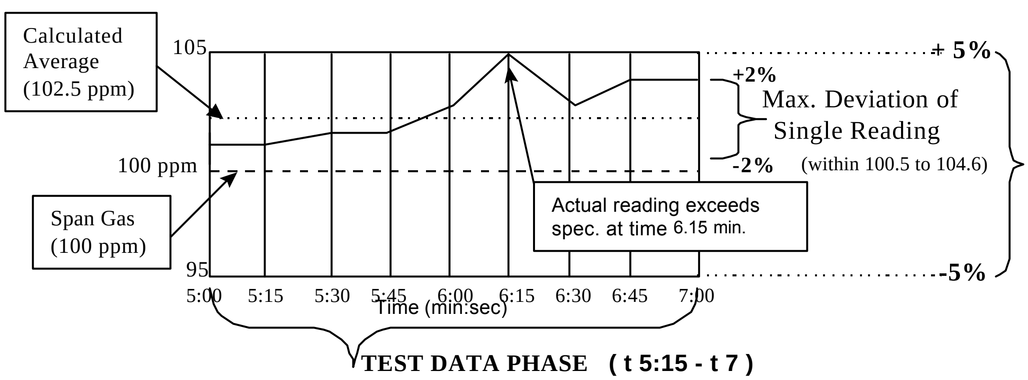

Figure 1C - Repeatability **4 Measurement cycles = 1 hour (for repeatability calibration only)**

Repeatability - The calculated average for the "TEST DATA PHASE" for NO, NO2 & CO shall not vary more than ± 3% or ± 1 ppm, whichever is less restrictive, of the span gas value for 4 measurement cycles

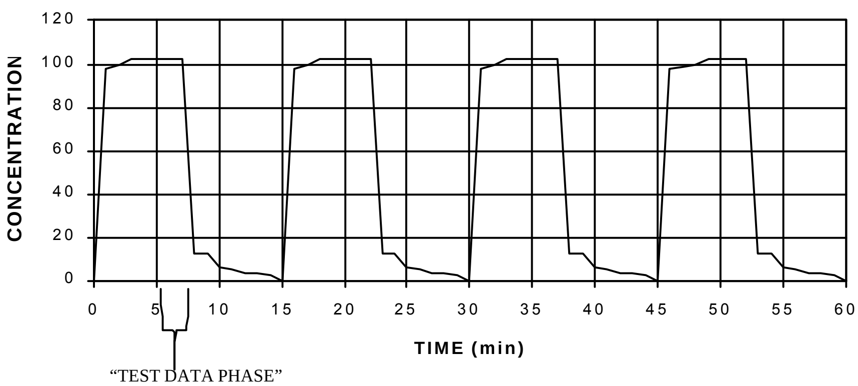

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Figure 2 - Calibration & Testing Schematic

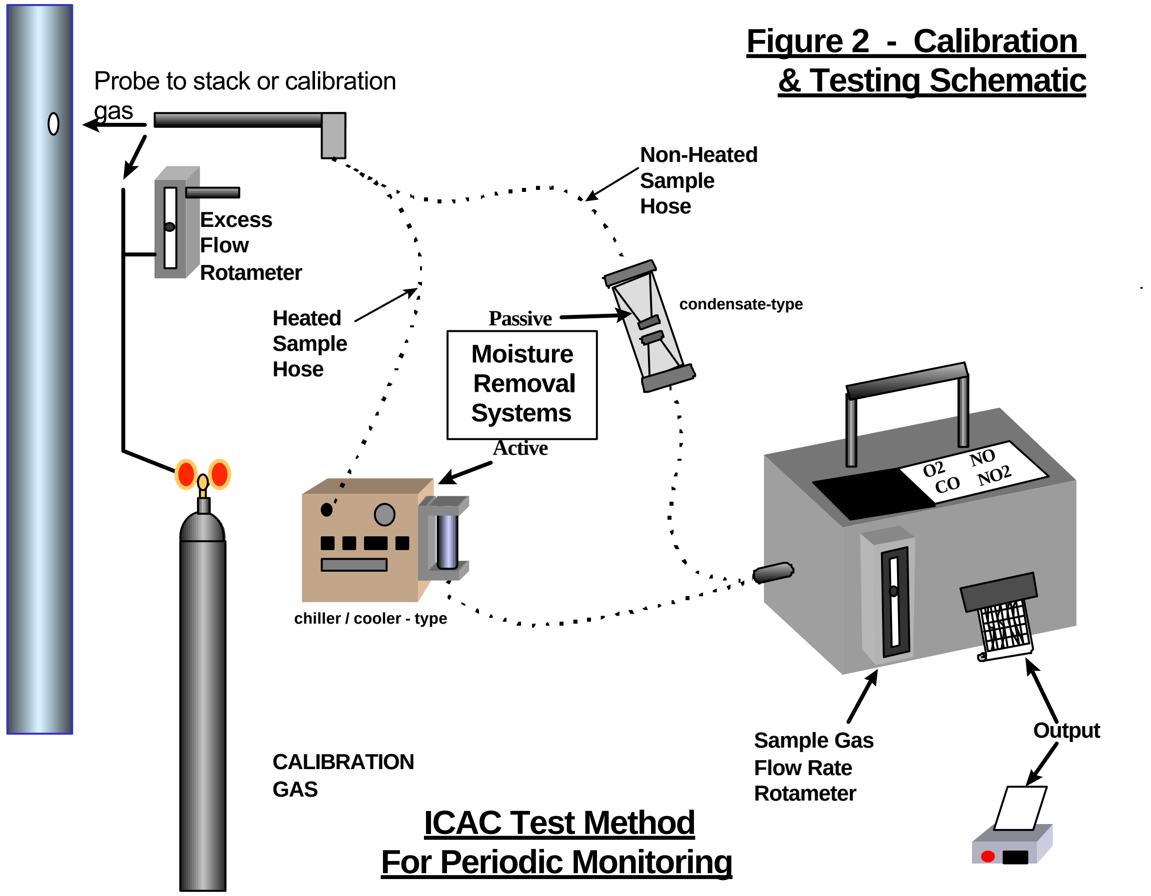

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Figure 3 - Periodic Monitoring Report

Facility Name & Address Phone			**Emission Point**			
Analyzer make & model:			**Serial #**			

Calibration Gas Verification Information

Calibration Gas Info. (manufacturer, expiration, etc.)	**Gas type**	**O_2 %**	**CO ppm**	**NO ppm**	**NO_2 ppm**	
	Concent.					

MEASUREMENT CYCLE (circle measurement task below)

Pre-Test Verification* / *Repeatability* / *Source Test* / *Post-Test Verification

(zero, span, interference) *(once per five days)* *(____________)* *(zero, span Interference)*

		Analyzer Response				Cell Temp	Flow Rate
Three Phases	**Date:**						
	Start time: AM /	**O_2%**	**CO ppm**	**NO ppm**	**NO_2 ppm**		
RAMP-UP Phase	t_1						
	t_2						
	t_3						
	t_4						
	t_5						
TEST DATA Phase	$t_{5:15}$						
	$t_{5:30}$						
	$t_{5:45}$						
	$t_{6:00}$						
	$t_{6:15}$						
	$t_{6:30}$						
	$t_{6:45}$						
	$t_{7:00}$						
Mean Average Concentration (sum of $t_{5:15}$ through $t_{7:00}$ ÷ 8)							
Maximum Deviation (no single reading exceeds ± 2% of mean average)							
Acceptable "Test Data Phase"		***Yes or No***	***Yes or No***	***Yes or No***	***Yes or No***		
RE-FRESH Phase	t_7						
	t_8						
	t_9						
	t_{10}						
	t_{11}						
	t_{12}						
	t_{13}						
	t_{14}						
	t_{15}						
Stop Time	AM / PM						
Cell Temperature (± 10°F for each run, Not to exceed 20° F for test day) and Sample Flow Rate are within specifications (± 10% or as verified)						***Yes or No***	***Yes or No***

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APPENDIX A

Test Results - Boilers & Heaters

(Operated at 90% of permitted load or greater during test? Yes or NO)

Facility name, address		**Emission Point:** **Test date:**
NAME:	**DATE:**	

Fuel Consumption (cf/hr, or gal/hr, etc...)	Fuel Heat Content (Btu/cf, or Btu/gal, etc...)	Boiler / Heater tested firing rate (MMBtu/hr, or hp/hr, etc...)

The tester may chose to correct the emissions data for a test run using the pre-test verification calibration and post-test verifications results. Use equation below for this correction.

$$C_{GAS} = (C_A - C_{PO}) \times \frac{C_S}{C_{PS} - C_{PO}}$$

C_{GAS} = corrected flue gas concentration
C_A = "Test Data Phase" average concentration indicated by portable analyzer
C_{PO} = average of Pre-test and Post-test Zero check
C_{PS} = average of Pre-test and Post-test Span checks
C_S = actual concentration of span gas

Emission Calculations:

$$\text{lb/MMBtu NOx} = (\text{ppm NOx}_{\text{corrected}})(1.19\text{x}10^{-7})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9 - O_2\%_{\text{corrected}}}\right)$$

$$\text{lb/MMBtu CO} = (\text{ppm CO}_{\text{corrected}})(7.27\text{x}10^{-8})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9 - O_2\%_{\text{corrected}}}\right)$$

$$\text{lb/hr NOx} = (\text{lb/MMBtu NOx})(\text{Heat Input}_{\text{Note 2}})$$

$$\text{lb/hr CO} = (\text{lb/MMBtu CO})(\text{Heat Input}_{\text{Note 2}})$$

Note 1: Use "F Factor" unless calculated based on the actual fuel gas composition and the higher heating value of the fuel.

Note 2: Heat input shall be based on the average hourly fuel usage rate during the test and the higher heating value of the fuel consumed if the boiler / heater is equipped with a fuel meter or the permitted maximum heat input if a fuel meter is

NOx (NO + NO_2) Results

Ave. Tested NO ppm	NO ppm (corrected)	Ave. Tested NO_2 ppm	NO_2 ppm (corrected)	NOx ppm (corrected)	As Tested	Allowable
					lb/MMBtu =	lb/MMBtu =
					lb/hr =	lb/hr =

O_2 Results		CO Results			
Ave. Tested O_2 %	O_2 % (corrected)	Ave. Tested CO ppm	CO ppm (corrected)	As Tested	Allowable
				lb/MMBtu =	lb/MMBtu =
				lb/hr =	lb/hr =

Test Results - Reciprocating Engines - Below 500 HP
(Operated at 90% of permitted load or greater during test? YES or NO)

Facility name, address		**Emission Point:** **Test date:**
NAME:	**DATE:**	

Suction/ Discharge Pressure	RPM	Fuel Throughput "compressed"	Fuel consumed "burned"	Fuel Heat Content	Unit Fuel Useage Spec.	Engine Tested Horsepower

The tester may chose to correct the emissions data for a test run using the pre-test verification calibration and post-test verifications results. Use equation below for this correction.

$$C_{GAS} = (C_A - C_{PO}) \times \frac{C_S}{C_{PS} - C_{PO}}$$

C_{GAS} = corrected flue gas concentration
C_A = "Test Data Phase" average concentration indicated by portable analyzer
C_{PO} = average of Pre-test and Post-test Zero check
C_{PS} = average of Pre-test and Post-test Span checks
C_S = actual concentration of span gas

Emission Calculations:

$$\text{gm/hp-hr NOx} = (\text{ppm NOx}_{\text{corrected}})(1.19\times10^{-7})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9-O_2\%_{\text{corrected}}}\right)(\text{Specific Fuel Consumption}_{\text{Note 2}})(10^{-6})(454)$$

$$\text{gm/hp-hr CO} = (\text{ppm CO}_{\text{corrected}})(7.27\times10^{-8})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9-O_2\%_{\text{corrected}}}\right)(\text{Specific Fuel Consumption}_{\text{Note 2}})(10^{-6})(454)$$

$$\text{lb/hr NOx} = \frac{(\text{gm/hp-hr NOx})(\text{Engine Horsepower}_{\text{Note 3}})}{454}$$

$$\text{lb/hr CO} = \frac{(\text{gm/hp-hr CO})(\text{Engine Horsepower}_{\text{Note 3}})}{454}$$

Note 1: Use "F Factor" unless calculated based on the actual fuel gas composition and the higher heating value of the fuel.
Note 2: Use Manufacture's specific fuel composition based on the higher heating value of the fuel. If the manufacturer does not provide a lower heating value, then multiply by 1.11 to obtain the specific fuel consumption based upon the higher heating value of the fuel
Note 3: Use derived operating horsepower (include calculation method). If derived horsepower is not available or cannot be obtained, use site rated horsepower.

NOx (NO + NO_2) Results

Ave. Tested NO ppm	NO ppm (corrected)	Ave. Tested NO_2 ppm	NO_2 ppm (corrected)	NOx ppm (corrected)	As Tested	Allowable
					gm/hp-hrs =	gm/hp-hrs =
					lb/hr =	lb/hr =

O_2 Results		**CO Results**			
Ave. Tested O_2 %	O_2 % (corrected)	Ave. Tested CO ppm	CO ppm (corrected)	As Tested	Allowable
				gm/hp-hrs =	gm/hp-hrs =
				lb/hr =	lb/hr =

Test Results - Reciprocating Engines - Above 500 HP Not Equipped w/ Fuel Meter
(Operated at 90% of permitted load or greater during test? YES or NO)

Facility name, address		**Emission Point:**
		Test date:
NAME:	**DATE:**	

Suction/ Discharge Pressure	RPM	Fuel Throughput "compressed"	Fuel consumed "burned"	Fuel Heat Content	Unit Fuel Useage Spec.	Engine Tested Horsepower

The tester may chose to correct the emissions data for a test run using the pre-test verification calibration and post-test verifications results. Use equation below for this correction.

$$C_{GAS} = (C_A - C_{PO}) \times \frac{C_S}{C_{PS} - C_{PO}}$$

C_{GAS} = corrected flue gas concentration
C_A = "Test Data Phase" average concentration indicated by portable analyzer
C_{PO} = average of Pre-test and Post-test Zero check
C_{PS} = average of Pre-test and Post-test Span checks
C_S = actual concentration of span gas

Emission Calculations:

$$\text{gm/hp-hr NOx} = (\text{ppm NOx}_{\text{corrected}})(1.19\times10^{-7})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9-O_2\%_{\text{corrected}}}\right)(\text{Specific Fuel Consumption}_{\text{Note 2}})(10^{-6})(454)$$

$$\text{gm/hp-hr CO} = (\text{ppm CO}_{\text{corrected}})(7.27\times10^{-8})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9-O_2\%_{\text{corrected}}}\right)(\text{Specific Fuel Consumption}_{\text{Note 2}})(10^{-6})(454)$$

$$\text{lb/hr NOx} = \frac{(\text{gm/hp-hr NOx})(\text{Engine Horsepower}_{\text{Note 3}})}{454}$$

$$\text{lb/hr CO} = \frac{(\text{gm/hp-hr CO})(\text{Engine Horsepower}_{\text{Note 3}})}{454}$$

Note 1: Use "F Factor" unless calculated based on the actual fuel gas composition and the higher heating value of the fuel.
Note 2: Default Specific Fuel Consumption (Btu/hp-hr) shall be as defined below for the particular type of engine.
Use 9,400 Btu/hp-hr (as default) for 4-cycle and 2-cycle lean burn engines.
Use 11,000 Btu/hp-hr (as default) for 2-cycle non-lean burn engines.
Note 3: Site-rated engine horsepower

NOx (NO + NO_2) Results

Ave. Tested NO ppm	NO ppm (corrected)	Ave. Tested NO_2 ppm	NO_2 ppm (corrected)	NOx ppm (corrected)	As Tested	Allowable
					gm/hp-hrs =	gm/hp-hrs =
					lb/hr =	lb/hr =

O_2 Results		CO Results			
Ave. Tested O_2 %	O_2 % (corrected)	Ave. Tested CO ppm	CO ppm (corrected)	As Tested	Allowable
				gm/hp-hrs =	gm/hp-hrs =

				lb/hr =	lb/hr =

Test Results - Reciprocating Engines & Combustion Turbines - Above 500 HP w/ Fuel Meter

(Operated at 90% of permitted load or greater during test? YES or NO)

Facility name, address		**Emission Point:**	
		Test date:	
NAME:		**DATE:**	

Suction/ Discharge Pressure	RPM	Fuel Throughput "compressed"	Fuel consumed "burned"	Fuel Heat Content	Unit Fuel Useage Spec.	Engine Tested Horsepower

The tester may chose to correct the emissions data for a test run using the pre-test verification calibration and post-test verifications results. Use equation below for this correction.

$$C_{GAS} = (C_A - C_{PO}) \times \frac{C_S}{C_{PS} - C_{PO}}$$

C_{GAS} = corrected flue gas concentration
C_A = "Test Data Phase" average concentration indicated by portable analyzer
C_{PO} = average of Pre-test and Post-test Zero check
C_{PS} = average of Pre-test and Post-test Span checks
C_S = actual concentration of span gas

Emission Calculations:

$$\text{lb/hr NOx} = (\text{ppm NOx}_{\text{corrected}})(1.19\times10^{-7})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9-O_2\%_{\text{corrected}}}\right)(\text{Heat Input / hr}_{\text{Note 2}})$$

$$\text{lb/hr CO} = (\text{ppm CO}_{\text{corrected}})(7.27\times10^{-8})(\text{F Factor}_{\text{Note 1}})\left(\frac{20.9}{20.9-O_2\%_{\text{corrected}}}\right)(\text{Heat Input / hr}_{\text{Note 2}})$$

$$\text{gm/hp-hr NOx} = \frac{(\text{lb/hr NOx})(454)}{(\text{Tested Horsepower}_{\text{Note 3}}) \text{ or } (\text{Calculated Engine Horsepower}_{\text{note 4}})}$$

$$\text{gm/hp-hr CO} = \frac{(\text{lb/hr CO})(454)}{(\text{Tested Horsepower}_{\text{Note 3}}) \text{ or } (\text{Calculated Engine Horsepower}_{\text{note 4}})}$$

Note 1: Use "F-factor" unless calculated based on the actual fuel gas composition and the higher heating value of the fuel.
Note 2: Heat input / hr. (MMBtu/hr) shall be based on the average hourly fuel usage during the test and the higher heating value of the fuel consumed
Note 3: Tested Horsepower is directly determined during test.
Note 4: Calculated Engine Horsepower $= \frac{(\text{Heat Input per Hour}_{\text{Note 2}})(10^6)}{(\text{Specific Fuel Consumption}_{\text{- See default below*}})}$

* use 9,400 Btu/hp-hr (as default) for 4-cycle and 2-cycle lean burn engines
* use 11,000 Btu/hp-hr (as default) for 2-cycle non-lean burn engines

For combustion turbine horsepower that cannot be determined during testing, the emissions shall be reported in terms of concentration (ppm by volume, dry basis) corrected to 15 percent O_2. Calculation to corrected to 15% O_2 is shown below:

$\text{ppm NOx}_{@ 15\% O2}$ = ppm NOx corrected (5.9) $\text{ppm CO}_{@ 15\% O2}$ = ppm CO corrected (5.9)

NOx (NO + NO_2) Results

Ave.Tested NO ppm	NO ppm (corrected)	Ave.Tested NO_2 ppm	NO_2 ppm (corrected)	NOx ppm (corrected)	As Tested	Allowable
					gm/hp-hrs =	gm/hp-hrs =
					lb/hr =	lb/hr =

O_2 Results / CO Results

Ave. Tested O_2 %	O_2 % (corrected)	Ave. Tested CO ppm	CO ppm (corrected)	As Tested	Allowable
				gm/hp-hrs =	gm/hp-hrs =
				lb/hr =	lb/hr =

F-Factors

An "F-Factor" is the ratio of the gas volume of the products of combustion to the heat content of the fuel.

F_d - Dry Factor, Includes all components of combustion less water.

F_w - Wet Factor, Includes all components of combustion.

F_c - Carbon Factor, Includes only carbon dioxide

Note: Since F-Factors include water resulting only from combustion of hydrogen in the fuel, The procedures using F_w factors are not applicable for computing emissions from steam generating units with wet scrubbers or with other processes that add water (e.g. steam injection).

F- Factors for Various Fuels [1]

	F_d		F_w		F_c	
Fuel Type	**dscm /J**	**dscf /10^6 Btu**	**wscm / J**	**wscm /10^6 Btu**	**scm / J**	**scf /10^6 Btu**
Coal:						
Anthracite[2]	$2.71 * 10^{-7}$	10000	$2.83 * 10^{-7}$	10540	$0.530 * 10^{-7}$	1970
Bituminus[2]	$2.63 * 10^{-7}$	9780	$2.86 * 10^{-7}$	10640	$0.484 * 10^{-7}$	1800
Lignite	$2.65 * 10^{-7}$	9860	$3.21 * 10^{-7}$	11950	$0.513 * 10^{-7}$	1910
Oil[3]	$2.47 * 10^{-7}$		$2.77 * 10^{-7}$	10320	$0.383 * 10^{-7}$	1420
Gas:						
Natural	$2.43 * 10^{-7}$	8710	$2.85 * 10^{-7}$	10610	$0.287 * 10^{-7}$	1040
Propane	$2.34 * 10^{-7}$	8710	$2.74 * 10^{-7}$	10200	$0.321 * 10^{-7}$	1190
Butane	$2.34 * 10^{-7}$	8710	$2.79 * 10^{-7}$	10390	$0.337 * 10^{-7}$	1250
Wood	$2.48 * 10^{-7}$	9240			$0.492 * 10^{-7}$	1830
Wood bark	$2.58 * 10^{-7}$	9600			$0.516 * 10^{-7}$	1920
Municiple	$2.57 * 10^{-7}$	9570			$0.488 * 10^{-7}$	1820
Solid Waste	********					

[1] Determined at standard conditions : 20° C (68° F) and 760 mm (29.92 in Hg).

[2] As classified according to ASTM D388-77.

[3] Crude, residual, or distillate.

Reader note: F-Factor table copied from US EPA 40 CFR, Pt 60, Appendix A, Method 19 -Determination of Sulfur Dioxide Removal efficiency and Particulate Martter, Sulfer Dioxide and Nitrogen Oxides Emissions Rates.

APPENDIX B

Batch Testing of Portable Gas Analyzer Flow Rate.

Background

In order to meet the requirements of Section 5.1.8 for sample flow rate, the manufacturer has the option of providing the user with a maximum and minimum allowable sample flow rate (outside of the method specified ± 10 percent) provided that the manufacturer performs a batch certification of flow rate vs. gas reading shift.

Procedure

Size of Batch

The manufacturer must randomly sample a portable gas analyzer once every three months or every 50 units, whichever comes first, from a production batch.

Testing

The manufacturer must monitor the flow rate of the sample and the gas concentration of the calibration (pollutant) gas continuously. Once the analyzer has reached a stable gas reading. The flow rate and concentration are recorded. The sample flow rate is then changed to the minimum recommended flow rate in 0.1 liter increments / min, through the full range of certified flow. The manufacturer must record the gas readings for each increment and compare these against the initial analyzer reading.

Each test must consist of three (3) identical runs. Each error band must include a standard deviation at 95 percent confidence level interval (per US EPA 40 CFR 60 Appendix B, PS1).

Documentation

The manufacturer must provide a certificate with each analyzer indicating conformance with the requirements of Section 5.1.8.

From: Angela Hansen [mailto:ahansen@hoeflernet.com]
To: Desberg,Wayne; Luce, Chuck
CC: Susan Lyon; Steve Fryberger; Kris Hansen
Sent: 2008, 12.17 Wed, 18:44:54
Subject: Electronic copy of final report

Attachments:
Final Report for Jorgensen Steel.pdf

Wayne - here is the electronic copy of your final report. I cut and pasted in the color graphs to make them more readable. Sorry the printed color copies didn't work out in the hard copies. Let me know if you need anything else.

Angela

Angela Hansen, QSTI
Principal Scientist
AmTest Air Quality, a Division of Hoefler Consulting Group
ahansen@hoeflernet.com
CELL: (208) 891-4550

From: Desberg,Wayne [mailto:wdesberg@JorgensenForge.com]
Sent: Wednesday, December 17, 2008 8:01 AM
To: Kris Hansen; Luce, Chuck
Cc: Angela Hansen; Susan Lyon; Steve Fryberger
Subject: RE: Jorgensen Forge Process Data
Importance: High

Team,

I still do not have an electronic version or a hard copy with the graphs cleaned up to send to Puget Sound. I think we are running out of time??

Thks

Wayne Desberg
Engineering Manager
Jorgensen Forge Corp.
8531 East Marginal Way South
Seattle, WA 98108-4018
206-300-7235

From: Kris Hansen [mailto:khansen@hoeflernet.com]
Sent: Thursday, December 04, 2008 7:51 AM
To: Desberg,Wayne; Luce, Chuck
Cc: Angela Hansen; Susan Lyon; Steve Fryberger
Subject: RE: Jorgensen Forge Process Data

Wayne – Attached are the results of the Ramping Tests. I put the results in a graphical format because the results vary with time and I thought that PSCAA might be interested in seeing how the results varied over the ramping period. As you can see there were no excursions over the emission limits during the ramping period. The bias corrected average results over the 3 hour period are also included

As Angie addressed in her email yesterday, we hope to have the report to you next week. Let me know if you have any questions or comments on the information presented in the attachments.

Thanks,
Kris

Kris Hansen, QEP
Sr. Consultant
AmTest Air Quality,
a Division of Hoefler Consulting Group
PO Box 525

PO Box 525
Preston, WA 98050
425-222-7746
425-222-7849 (fax)
khansen@hoeflernet.com
www.amtestairquality.com

From: Desberg,Wayne [mailto:wdesberg@JorgensenForge.com]
Sent: Tuesday, December 02, 2008 7:13 PM
To: Kris Hansen; Luce, Chuck
Cc: Angela Hansen; Susan Lyon; Steve Fryberger
Subject: RE: Jorgensen Forge Process Data

Kris,

How are we coming on getting the report from the testing coming along? I'd like to get this out to the Agency as soon as possible.

Thks

Wayne Desberg
Engineering Manager
Jorgensen Forge Corp.
8531 East Marginal Way South
Seattle, WA 98108-4018
206-300-7235

From: Kris Hansen [mailto:khansen@hoeflernet.com]
Sent: Monday, November 24, 2008 4:13 PM
To: Luce, Chuck; Desberg,Wayne
Cc: Angela Hansen; Susan Lyon; Steve Fryberger
Subject: Jorgensen Forge Process Data

Chuck and Wayne – I have input the results from the recent tests and it appears that you will pass at all sites. I will forward these results to you as soon as they are QA'd. Based on my understanding of our teleconference with PSCAA prior to testing, I was not planning to do M19 calculations to determine the theoretical airflow, even though this is discussed in the test plan. I doubt if those calculations would be very accurate without corresponding airflow measurements at the preheater exhaust. It was my understanding that they were satisfied with the lb/1000 therms emission factor that was determined in the 1st set of testing and that all they really cared about was that the forge exhausts met the emission concentration limits corrected to 3% oxygen.

We should however supply some process information to go along with the testing. Do you have a record of the fuel flow rate during testing? Testing was performed on November 21 and the run times were 0820-0920, 0939-1039, and 1052-1152, for runs 1, 2, and 3, respectively. Other information with respect to forge operating conditions, such as temperatures and process rates, would also be helpful. Generally the purpose of this type of information is so that if the agency does an inspection they can ascertain that the process is operating in a similar manner as it was during the compliance testing. If you could please email me a PDF of the process information I would appreciate it.

Thanks,
Kris
Kris Hansen, QEP
Sr. Consultant
AmTest Air Quality,
a Division of Hoefler Consulting Group
PO Box 525
Preston, WA 98050
425-222-7746
425-222-7849 (fax)
khansen@hoeflernet.com
www.amtestairquality.com

From: John Laplante [mailto:jlaplante@anchorenv.com]
To: Luce, Chuck
CC: Ryan Barth
Sent: 2007, 08.16 Thu, 22:33:55
Subject: Field Report and Follow-up Footing Inspection

Attachments:
Field Report 081607.pdf

Hi Chuck-

Attached is a copy of the field report from my site visit yesterday. I spoke with Ryan Barth and he confirmed that he will be able to visit and inspect the gravel backfill tomorrow at 3pm.

Please let me know if you have any questions.

Thanks.

John P. Laplante, P.E.
Anchor Environmental, L.L.C.
1423 3rd Avenue, Suite 300
Seattle, WA 98101

206-903-3323 direct
206-287-9131 fax

Temporary Boiler

Basis:	Fired Duty	15	MM Btu/hr
	Firing Natural Gas	1020	Btu/scf
	Estimated Annual Heat Release	131.40	MMMBtu/yr
	Duration, months	12	

Toxic Emissions Estimate

Constitutent	Factor Reference	Emission Factor $lb/10^6$ scf	Emissions (lb/yr) Temporary Boiler	12 Months
Arsenic	1	0.0002	0.026	0.026
Barium	1	0.0044	0.567	0.567
Beryllium	1	0.000012	0.002	0.002
Cadmium	1	0.0011	0.142	0.142
Chromium - Total	1	0.0014	0.180	0.180
Cobalt	1	0.000084	0.011	0.011
Copper	1	0.00085	0.110	0.110
Manganese	1	0.00038	0.049	0.049
Mercury	1	0.00026	0.033	0.033
Molybdenum	1	0.0011	0.142	0.142
Nickel	1	0.0021	0.271	0.271
Selenium	1	0.000024	0.003	0.003
Vanadium	1	0.0023	0.296	0.296
Zinc	1	0.0290	3.736	3.736
				0.000
2-Methylnaphthalene	1	0.000024	0.003	0.003
3-Methylchloranthrene	1	0.0000018	0.000	0.000
7,12-Dimethylbenz(a)anthracene	1	0.000016	0.002	0.002
Acenaphthene	1	0.0000018	0.000	0.000
Acenaphthylene	1	0.0000018	0.000	0.000
Acetaldehyde	2	0.0009	0.116	0.116
Acrolein	2	0.0008	0.103	0.103
Anthracene	1	0.0000024	0.000	0.000
Benzene	1	0.0021	0.271	0.271
Benzo(a) anthracene	1	0.0000018	0.000	0.000
Benzo(a) pyrene	1	0.0000012	0.000	0.000
Benzo(b) fluoranthene	1	0.0000018	0.000	0.000
Benzo(g,h,i) perylene	1	0.0000012	0.000	0.000
Benzo(k) fluoranthene	1	0.0000018	0.000	0.000
Butane	1	2.1	270.529	270.529
Chryene	1	0.0000018	0.000	0.000
Dibenz(a,h) anthracene	1	0.0000012	0.000	0.000
Dichlorobenzene	1	0.0012	0.155	0.155
Ethane	1	3.1	399.353	399.353
Ethylbenzene	2	0.002	0.258	0.258
Fluoranthene	1	0.000003	0.000	0.000
Fluorene	1	0.0000028	0.000	0.000
Formaldehyde	1	0.0750	9.662	9.662
Hexane	1	1.8	231.882	231.882
Indeno(1,2,3-cd) pyrene	1	0.0000018	0.000	0.000
Naphthalene	1	0.00061	0.079	0.079
Pentane	1	2.6	334.941	334.941
Phenanthrene	1	0.000017	0.002	0.002
Propane	1	1.6	206.118	206.118
Propylene	2	0.01553	2.001	2.001

Pyrene	1	0.000005	0.001	0.001
Toluene	1	0.0034	0.438	0.438
Xylenes	2	0.0058	0.747	0.747

Factors:

(1) Emission Factors from AP-42, Section 1.4, Natural Gas Combustion, Table 1.4-3, Emission Factors for Speciated Organic Compounds from Natural Gas Combustion and Table 1.4-4, Emission Factors for Metals from Natural Gas Combustion

(2) Emission Factors from Ventura County Air Pollution Control District, AB 2588 Combustion Emission Factors, Natural Gas Fired Combustion Equipment, May 17, 2001

Emission Estimates:

Where emission factors existed from more than one source they were selected in the following order:
1 - AP-42, 2 - Ventura County

Calculation:

(E.F. lb/10^6 scf)

Total Toxic Emission Summary
WA TAPS Emission Estimates

Constituent	WA Toxics Classification	Total (1) Stack (lb/yr)	SQER lb/yr	ASIL ug/m3	Comments	Percent of SQER
Acetaldehyde	A	0.1159	50	0.45		0.23%
Arsenic	A	0.0258	None	0.00023		Model
Benzene	A	0.271	20	0.12		1.35%
Sum of PAH's	A	0.00147	None	0.00048	7-PAH	Model
Benzo(a) anthracene	A	0.00023			7-PAH	
Benzo(a) pyrene	A	0.00015			7-PAH	
Benzo(b) fluoranthene	A	0.00023			7-PAH	
Benzo(k) fluoranthene	A	0.00023			7-PAH	
Chryene	NA	0.00023			7-PAH	
Dibenz(a,h) anthracene	A	0.00015			7-PAH	
Indeno(1,2,3-cd) pyrene	A	0.00023			7-PAH	
Beryllium	A	0.00155	None	0.00042		
Cadmium	A	0.142	None	0.00056		
Chromium - Total	A	0.180	175	1.7		0.10%
Dichlorobenzene	A	0.1546	500	1.5	Assumed 1,4	0.03%
Formaldehyde	A	9.66	20	0.077		48.31%
Nickel	A	0.271	0.5	0.0021		54.11%
Acrolein	B	0.1031	175	0.02		0.06%
Barium	B	0.567	175	1.7		0.32%
Butane	B	270.5	43748	6300		0.62%
Cobalt	B	0.01082	175			0.01%
Copper	B	0.1095	175	0.67		0.06%
Ethylbenzene	B	0.258	43748	1000		0.00%
Hexane	B	231.882	22750	200		1.02%
Manganese	B	0.0490	175	0.02		0.03%
Mercury	B	0.0335	175	0.33		0.02%
Molybdenum	B	0.142	1750	17		0.01%
Naphthalene	B	0.0786	22750	170		0.00%
Pentane	B	334.9	43748	6000		0.77%
Selenium	B	0.00309	175	0.67		0.00%
Toluene	B	0.438	43748	400		0.00%
Vanadium	B	0.296	175	0.17		0.17%
Xylenes	B	0.747	43748	1500		0.00%
Zinc	B	3.736	1750	17		0.21%

Notes:

(1) Basis - EPA AP-42, Ventura Co. AB-2588, and API data for natural gas fired, external combustion equipment.
Ventura County APCD, AB-2588 Combustion Emission Factors, Technical Memorandum, Ventura, CA, 12/30/92.

From: Ryan Barth [mailto:rbarth@anchorenv.com]
To: Altier, Ron
CC: Luce, Chuck; Ryan Barth
Sent: 2007, 07.23 Mon, 20:58:24
Subject: Furnace Soil Analytical

Attachments:
LG59_tclp.pdf
LE63_Jorgensen_Metals_Forms.pdf

Ron –

Attached please find the analytical results for the soil characterization representative of the material that will be removed to support the new furnace. The first attachment provides the results for the TCLP leachate and the second attachment provides the bulk soils results.

As discussed, I would hold off on scheduling Evergreen to coordinate disposal of this material until I have a chance to compare their prices to those provided by Waste Management.

ry

Ryan Barth, P.E.
Anchor Environmental LLC
1423 3rd Avenue, Suite 300
Seattle, Washington 98101
(206) 903-3334 Direct Line
(206) 287-9130 Office Line
(206) 287-9131 Fax
rbarth@anchorenv.com
www.anchorenv.com

From: Fennell, Tony [mailto:tfennell@bloomeng.com]
To: Bossert, Jim
CC: Schalles, David; Dormire, John; Luce, Chuck; Cogley, Ben
Sent: 2008, 06.04 Wed, 22:39:31
Subject: FW: F-11 Forge Furnace-gas sample back of furnace above car

Attachments:
SKMBT_C35208060410150.pdf

Jim:

Attached are the latest NOx readings which are close to what Jorgensen needs, but still a bit too high. Of interest is the 4.5% Oxygen in the furnace itself, which suggests 25% excess air. In light of the 10.5 ratio you set earlier in the week, it also suggests that infiltration is occurring into the furnace.

Chuck Luce measure the furnace pressure setpoint at .035"Wc, which is not bad, but could not get into the program to change it. Can you monitor the furnace pressure from where you are? Do you see the .035"Wc setpoint as well. Do you know how to change the setpoint? If so, please send an email out and Chuck will call you sometime in the morning his time to experiment with higher setpoints.

Tony

From: Luce, Chuck [mailto:cluce@JorgensenForge.com]
Sent: Wednesday, June 04, 2008 11:15 AM
To: Fennell, Tony
Subject: F-11 Forge Furnace-gas sample back of furnace above car

Tony;

Is this better?

Chuck

From: Luce, Chuck
To: 'Fennell, Tony'
Sent: 2008, 06.04 Wed, 18:16:38
Subject: FW: F-11 Furnace gasses above west damper

Attachments:
SKMBT_C35208060408550.pdf

Hi Tony;

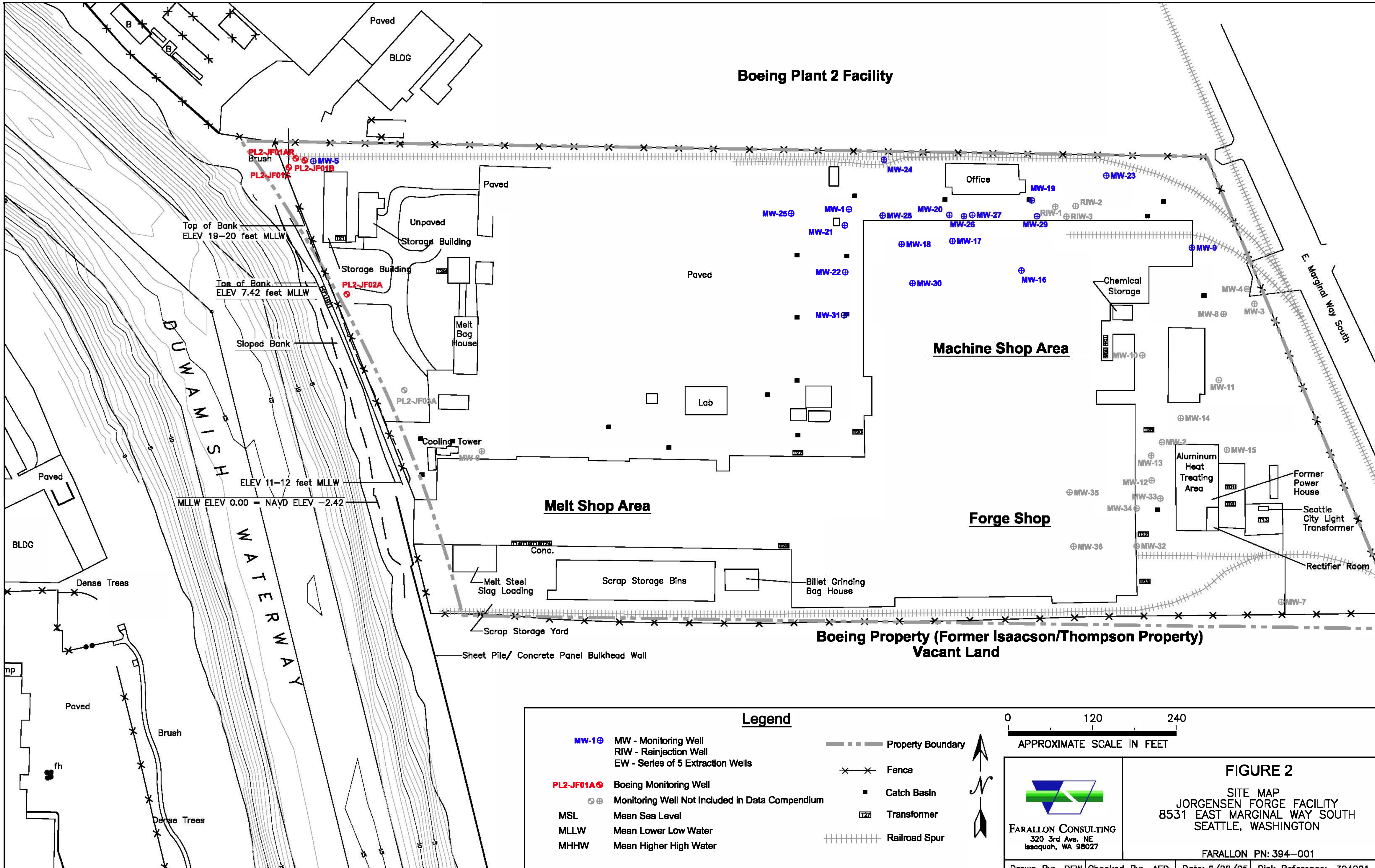
Here is the latest data. Looks a lot better except we are still too high in NOx.
Where do we go from here?

Chuck Luce

From: Luce, Chuck
To: 'Fennell, Tony'
Sent: 2008, 06.03 Tue, 23:34:15
Subject: FW: Flue gasses taken approx two feet down from top of stack

Attachments:
SKMBT_C35208060314240.pdf

From: KonicaC352@jorgensenforge.com [mailto:KonicaC352@jorgensenforge.com]
Sent: Tuesday, June 03, 2008 7:25 AM
To: Luce, Chuck
Subject: Flue gasses taken approx two feet down from top of stack



Boeing Plant 2 Facility
Paved
BLDG
Brush
PL2-JF01AR
PL2-JF01B
PL2-JF01C
MW-5
Top of Bank ELEV 19–20 feet MLLW
Toe of Bank ELEV 7.42 feet MLLW
Sloped Bank
DUWAMISH WATERWAY
ELEV 11–12 feet MLLW
MLLW ELEV 0.00 = NAVD ELEV –2.42
Paved
Unpaved
Storage Building
Storage Building
PL2-JF02A
Melt Bag House
PL2-JF03A
Cooling Tower
MW-6
Melt Shop Area
Conc.
Melt Steel Slag Loading
Scrap Storage Bins
Billet Grinding Bag House
Scrap Storage Yard
Sheet Pile/ Concrete Panel Bulkhead Wall
Dense Trees
Brush
fh
Lab
Office
Machine Shop Area
Forge Shop
Chemical Storage
Aluminum Heat Treating Area
Former Power House
Seattle City Light Transformer
Rectifier Room
E. Marginal Way South
MW-1 MW-2 MW-3 MW-4 MW-7 MW-8 MW-9 MW-10 MW-11 MW-12 MW-13 MW-14 MW-15 MW-16 MW-17 MW-18 MW-19 MW-20 MW-21 MW-22 MW-23 MW-24 MW-25 MW-26 MW-27 MW-28 MW-29 MW-30 MW-31 MW-32 MW-33 MW-34 MW-35 MW-36
RIW-1 RIW-2 RIW-3
Boeing Property (Former Isaacson/Thompson Property)
Vacant Land
Legend
MW-1 MW - Monitoring Well
RIW - Reinjection Well
EW - Series of 5 Extraction Wells
PL2-JF01A Boeing Monitoring Well
Monitoring Well Not Included in Data Compendium
MSL Mean Sea Level
MLLW Mean Lower Low Water
MHHW Mean Higher High Water
Property Boundary
Fence
Catch Basin
Transformer
Railroad Spur
N
0 120 240
APPROXIMATE SCALE IN FEET
FARALLON CONSULTING
320 3rd Ave. NE
Issaquah, WA 98027
FIGURE 2
SITE MAP
JORGENSEN FORGE FACILITY
8531 EAST MARGINAL WAY SOUTH
SEATTLE, WASHINGTON
FARALLON PN: 394–001
Drawn By: DEW
Checked By: AED
Date: 6/28/05
Disk Reference: 394001

09/20/07
16:34:55

*** SCREEN3 MODEL RUN ***
*** VERSION DATED 96043 ***

jorgensen

SIMPLE TERRAIN INPUTS:
SOURCE TYPE = AREA
EMISSION RATE (G/(S-M**2)) = .100000E-02
SOURCE HEIGHT (M) = 22.8600
LENGTH OF LARGER SIDE (M) = 31.7000
LENGTH OF SMALLER SIDE (M) = 31.7000
RECEPTOR HEIGHT (M) = .0000
URBAN/RURAL OPTION = URBAN
THE REGULATORY (DEFAULT) MIXING HEIGHT OPTION WAS SELECTED.
THE REGULATORY (DEFAULT) ANEMOMETER HEIGHT OF 10.0 METERS WAS ENTERED.

MODEL ESTIMATES DIRECTION TO MAX CONCENTRATION

BUOY. FLUX = .000 M**4/S**3; MOM. FLUX = .000 M**4/S**2.

*** FULL METEOROLOGY ***

****
*** SCREEN AUTOMATED DISTANCES ***
****

*** TERRAIN HEIGHT OF 0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

DIST (M)	CONC (UG/M**3)	STAB	U10M (M/S)	USTK (M/S)	MIX HT (M)	PLUME HT (M)	MAX DIR (DEG)
31.	56.09	1	1.0	1.1	320.0	22.86	44.
100.	297.8	3	1.0	1.2	320.0	22.86	45.
200.	209.2	4	1.0	1.2	320.0	22.86	37.
300.	199.3	5	1.0	1.3	10000.0	22.86	36.
400.	156.7	5	1.0	1.3	10000.0	22.86	1.
500.	121.5	5	1.0	1.3	10000.0	22.86	38.
600.	96.31	5	1.0	1.3	10000.0	22.86	30.
700.	78.31	5	1.0	1.3	10000.0	22.86	11.
800.	65.19	5	1.0	1.3	10000.0	22.86	1.
900.	55.29	5	1.0	1.3	10000.0	22.86	3.
1000.	47.66	5	1.0	1.3	10000.0	22.86	17.
1100.	41.68	5	1.0	1.3	10000.0	22.86	23.
1200.	36.88	5	1.0	1.3	10000.0	22.86	31.
1300.	32.96	5	1.0	1.3	10000.0	22.86	31.
1400.	29.72	5	1.0	1.3	10000.0	22.86	27.
1500.	27.00	5	1.0	1.3	10000.0	22.86	12.
1600.	24.70	5	1.0	1.3	10000.0	22.86	9.
1700.	22.73	5	1.0	1.3	10000.0	22.86	6.
1800.	21.02	5	1.0	1.3	10000.0	22.86	3.

```
  1900.   19.53       5     1.0    1.3 10000.0   22.86      1.
  2000.   18.22       5     1.0    1.3 10000.0   22.86      2.

 MAXIMUM 1-HR CONCENTRATION AT OR BEYOND    31. M:
    88.   306.6       3     1.0    1.2   320.0   22.86     44.

 *********************************
 *** SCREEN DISCRETE DISTANCES ***
 *********************************

 *** TERRAIN HEIGHT OF    0. M ABOVE STACK BASE USED FOR FOLLOWING DISTANCES ***

   DIST     CONC            U10M   USTK  MIX HT   PLUME  MAX DIR
    (M)   (UG/M**3)   STAB  (M/S)  (M/S)    (M)    HT (M)   (DEG)
 -------  ----------  ----  -----  -----  ------  ------  -------
    35.   81.94       1     1.0    1.1   320.0   22.86     39.
    40.   120.2       1     1.0    1.1   320.0   22.86     37.
    45.   161.5       1     1.0    1.1   320.0   22.86     41.
    50.   200.8       1     1.0    1.1   320.0   22.86     40.
    55.   233.3       1     1.0    1.1   320.0   22.86     45.
    60.   256.5       1     1.0    1.1   320.0   22.86     44.
    65.   270.3       1     1.0    1.1   320.0   22.86     45.
    70.   275.8       1     1.0    1.1   320.0   22.86     43.
    75.   289.3       3     1.0    1.2   320.0   22.86     43.
    80.   300.5       3     1.0    1.2   320.0   22.86     45.
    85.   305.8       3     1.0    1.2   320.0   22.86     45.
    90.   306.3       3     1.0    1.2   320.0   22.86     44.
    95.   303.4       3     1.0    1.2   320.0   22.86     43.
   100.   297.8       3     1.0    1.2   320.0   22.86     45.
   105.   290.3       3     1.0    1.2   320.0   22.86     42.
   110.   281.5       3     1.0    1.2   320.0   22.86     45.
   115.   281.5       4     1.0    1.2   320.0   22.86     43.
   120.   284.9       4     1.0    1.2   320.0   22.86     45.
   125.   286.0       4     1.0    1.2   320.0   22.86     44.
   130.   285.4       4     1.0    1.2   320.0   22.86     43.
   135.   283.3       4     1.0    1.2   320.0   22.86     42.
   140.   280.1       4     1.0    1.2   320.0   22.86     42.
   145.   275.9       4     1.0    1.2   320.0   22.86     44.
   150.   270.9       4     1.0    1.2   320.0   22.86     45.
   155.   265.5       4     1.0    1.2   320.0   22.86     45.
   160.   259.7       4     1.0    1.2   320.0   22.86     44.
   165.   253.5       4     1.0    1.2   320.0   22.86     41.
   170.   247.2       4     1.0    1.2   320.0   22.86     44.
   175.   240.8       4     1.0    1.2   320.0   22.86     44.
   180.   234.4       4     1.0    1.2   320.0   22.86     43.
   185.   228.0       4     1.0    1.2   320.0   22.86     43.
   190.   221.6       4     1.0    1.2   320.0   22.86     45.
   195.   215.3       4     1.0    1.2   320.0   22.86     34.

     ***************************************
     *** SUMMARY OF SCREEN MODEL RESULTS ***
     ***************************************

  CALCULATION       MAX CONC    DIST TO   TERRAIN
```

```
  PROCEDURE       (UG/M**3)    MAX (M)    HT (M)
--------------    -----------   -------   -------
SIMPLE TERRAIN      306.6         88.        0.


***************************************************
** REMEMBER TO INCLUDE BACKGROUND CONCENTRATIONS **
***************************************************
```

AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP

Run 1 Ramping STRATA Version 3.01
Operators: KBA
Plant Name: Jorgensen Forge Corporation
Site: All Stacks
Location: Seattle, Washington

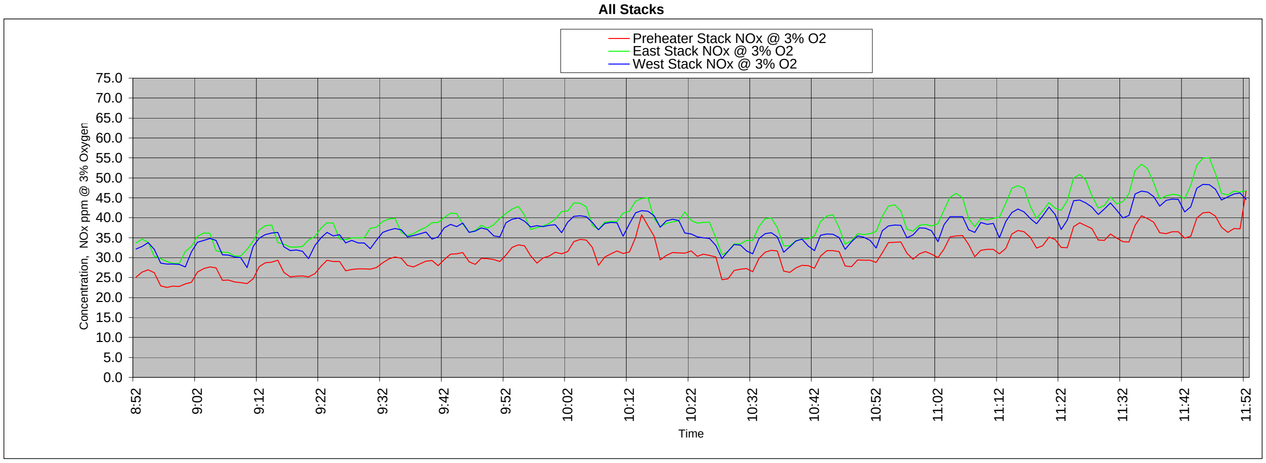
		Lime Green	Blue	Red
		East Stack NOx @ 3% O_2	West Stack NOx @ 3% O_2	Preheater Stack NOx @ 3% O_2
11/20/2008	8:52	33.65	32.16	25.10
11/20/2008	8:53	34.65	32.84	26.36
11/20/2008	8:54	33.85	33.73	26.93
11/20/2008	8:55	30.36	32.09	26.21
11/20/2008	8:56	29.75	28.67	22.94
11/20/2008	8:57	29.04	28.36	22.54
11/20/2008	8:58	28.54	28.39	22.82
11/20/2008	8:59	28.58	28.33	22.82
11/20/2008	9:00	31.50	27.71	23.43
11/20/2008	9:01	32.82	31.48	23.85
11/20/2008	9:02	35.37	33.84	26.41
11/20/2008	9:03	36.19	34.33	27.27
11/20/2008	9:04	36.07	34.81	27.70
11/20/2008	9:05	31.76	34.33	27.46
11/20/2008	9:06	31.35	30.73	24.31
11/20/2008	9:07	31.27	30.63	24.39
11/20/2008	9:08	30.39	30.19	23.93
11/20/2008	9:09	30.40	30.04	23.72
11/20/2008	9:10	32.10	27.48	23.47
11/20/2008	9:11	34.17	32.82	24.69
11/20/2008	9:12	36.88	34.91	27.79
11/20/2008	9:13	38.01	35.79	28.76
11/20/2008	9:14	38.19	36.18	28.85
11/20/2008	9:15	33.78	36.32	29.34
11/20/2008	9:16	33.40	32.70	26.28
11/20/2008	9:17	32.66	31.74	25.22
11/20/2008	9:18	32.66	31.93	25.34
11/20/2008	9:19	32.79	31.58	25.46
11/20/2008	9:20	34.43	29.74	25.19
11/20/2008	9:21	35.29	33.04	26.02
11/20/2008	9:22	37.38	34.95	27.83
11/20/2008	9:23	38.75	36.35	29.32
11/20/2008	9:24	38.66	35.46	29.05
11/20/2008	9:25	34.66	35.80	29.03
11/20/2008	9:26	34.48	33.68	26.70
11/20/2008	9:27	35.01	34.37	27.04
11/20/2008	9:28	34.95	33.72	27.23
11/20/2008	9:29	35.01	33.70	27.20
11/20/2008	9:30	37.34	32.22	27.10
11/20/2008	9:31	37.63	34.37	27.55
11/20/2008	9:32	39.05	36.31	28.75
11/20/2008	9:33	39.70	36.90	29.65
11/20/2008	9:34	39.90	37.28	30.16
11/20/2008	9:35	36.37	37.00	29.88
11/20/2008	9:36	35.55	35.18	28.07
11/20/2008	9:37	36.05	35.53	27.69
11/20/2008	9:38	36.90	35.95	28.36
11/20/2008	9:39	37.61	36.41	29.16
11/20/2008	9:40	38.78	34.69	29.30
11/20/2008	9:41	38.82	35.21	27.96
11/20/2008	9:42	40.04	37.44	29.53
11/20/2008	9:43	41.19	38.38	30.92
11/20/2008	9:44	41.10	37.76	30.93
11/20/2008	9:45	38.44	38.65	31.29
11/20/2008	9:46	36.31	36.34	28.99
11/20/2008	9:47	36.81	36.66	28.32
11/20/2008	9:48	38.12	37.49	29.80
11/20/2008	9:49	37.35	37.07	29.76
11/20/2008	9:50	38.25	35.43	29.52
11/20/2008	9:51	39.84	35.20	29.06
11/20/2008	9:52	41.04	38.73	30.63
11/20/2008	9:53	42.23	39.63	32.57
11/20/2008	9:54	42.87	39.97	33.23
11/20/2008	9:55	40.65	39.15	32.98
11/20/2008	9:56	37.04	37.67	30.51
11/20/2008	9:57	37.56	38.04	28.62
11/20/2008	9:58	37.97	37.80	29.95
11/20/2008	9:59	38.62	38.08	30.38
11/20/2008	10:00	39.66	38.24	31.39
11/20/2008	10:01	41.59	36.26	30.92
11/20/2008	10:02	41.73	38.90	31.55
11/20/2008	10:03	43.71	40.31	34.00
11/20/2008	10:04	43.66	40.54	34.60
11/20/2008	10:05	42.72	40.31	34.38
11/20/2008	10:06	38.09	38.79	32.56
11/20/2008	10:07	37.07	36.99	28.04
11/20/2008	10:08	38.93	38.62	30.14
11/20/2008	10:09	39.06	38.85	30.93
11/20/2008	10:10	39.09	38.72	31.71
11/20/2008	10:11	41.14	35.37	31.06
11/20/2008	10:12	41.63	38.51	31.45
11/20/2008	10:13	44.12	41.23	35.09
11/20/2008	10:14	44.82	41.76	40.75
11/20/2008	10:15	44.96	41.66	37.91
11/20/2008	10:16	39.81	40.47	35.35
11/20/2008	10:17	37.80	37.66	29.40
11/20/2008	10:18	38.62	39.19	30.57
11/20/2008	10:19	38.95	39.59	31.27
11/20/2008	10:20	39.24	39.31	31.17
11/20/2008	10:21	41.49	36.21	31.09
11/20/2008	10:22	39.28	35.90	31.71
11/20/2008	10:23	38.65	35.22	30.34
11/20/2008	10:24	38.86	34.95	30.91
11/20/2008	10:25	38.89	34.82	30.54
11/20/2008	10:26	34.96	33.08	30.16
11/20/2008	10:27	30.75	29.74	24.48
11/20/2008	10:28	31.50	31.59	24.72
11/20/2008	10:29	33.41	33.31	26.77
11/20/2008	10:30	33.47	33.10	27.14
11/20/2008	10:31	34.32	31.72	27.29
11/20/2008	10:32	34.31	30.97	26.48
11/20/2008	10:33	37.87	34.85	29.86

11/20/2008	10:34	39.75	36.03	31.36
11/20/2008	10:35	39.93	36.26	31.82
11/20/2008	10:36	37.55	35.24	31.72
11/20/2008	10:37	32.97	31.36	26.67
11/20/2008	10:38	33.00	32.73	26.33
11/20/2008	10:39	34.29	34.20	27.45
11/20/2008	10:40	34.61	34.65	28.10
11/20/2008	10:41	34.70	32.92	28.03
11/20/2008	10:42	35.46	31.75	27.39
11/20/2008	10:43	39.06	35.58	30.42
11/20/2008	10:44	40.45	35.91	31.76
11/20/2008	10:45	40.73	35.86	31.79
11/20/2008	10:46	37.56	35.05	31.54
11/20/2008	10:47	33.38	32.07	27.90
11/20/2008	10:48	34.24	34.03	27.74
11/20/2008	10:49	35.98	35.46	29.46
11/20/2008	10:50	35.79	35.11	29.35
11/20/2008	10:51	36.00	34.33	29.40
11/20/2008	10:52	36.56	32.40	28.77
11/20/2008	10:53	40.38	36.75	31.19
11/20/2008	10:54	42.93	37.96	33.78
11/20/2008	10:55	43.20	38.20	33.86
11/20/2008	10:56	41.73	38.07	33.90
11/20/2008	10:57	37.17	34.95	31.09
11/20/2008	10:58	36.67	35.71	29.57
11/20/2008	10:59	38.09	37.47	30.95
11/20/2008	11:00	38.31	37.39	31.51
11/20/2008	11:01	37.92	36.76	30.91
11/20/2008	11:02	38.53	33.97	30.00
11/20/2008	11:03	41.95	38.27	32.19
11/20/2008	11:04	45.18	40.23	35.19
11/20/2008	11:05	46.12	40.29	35.48
11/20/2008	11:06	45.01	40.27	35.57
11/20/2008	11:07	39.81	36.98	33.27
11/20/2008	11:08	37.77	36.33	30.21
11/20/2008	11:09	39.79	38.86	31.88
11/20/2008	11:10	39.49	38.33	32.09
11/20/2008	11:11	39.88	38.60	32.08
11/20/2008	11:12	40.13	34.94	30.93
11/20/2008	11:13	43.65	39.09	32.35
11/20/2008	11:14	47.41	41.35	35.96
11/20/2008	11:15	48.04	42.21	36.82
11/20/2008	11:16	47.44	41.48	36.50
11/20/2008	11:17	42.83	39.80	35.03
11/20/2008	11:18	39.86	38.47	32.44
11/20/2008	11:19	41.62	40.46	32.94
11/20/2008	11:20	43.79	42.65	35.16
11/20/2008	11:21	42.46	40.81	34.54
11/20/2008	11:22	41.85	37.04	32.55
11/20/2008	11:23	44.25	39.40	32.52
11/20/2008	11:24	49.97	44.26	37.76
11/20/2008	11:25	50.89	44.45	38.75
11/20/2008	11:26	49.50	43.70	38.04
11/20/2008	11:27	45.57	42.65	37.27
11/20/2008	11:28	42.45	40.85	34.38
11/20/2008	11:29	43.10	42.18	34.32
11/20/2008	11:30	45.27	43.72	35.96
11/20/2008	11:31	43.51	41.89	34.86
11/20/2008	11:32	44.02	39.93	34.02
11/20/2008	11:33	46.05	40.59	33.93
11/20/2008	11:34	51.83	45.95	38.12
11/20/2008	11:35	53.44	46.65	40.54
11/20/2008	11:36	52.31	46.48	39.81
11/20/2008	11:37	48.87	45.36	38.91
11/20/2008	11:38	44.74	42.89	36.24
11/20/2008	11:39	45.47	44.35	35.99
11/20/2008	11:40	45.91	44.70	36.49
11/20/2008	11:41	45.71	44.59	36.46
11/20/2008	11:42	44.78	41.50	34.92
11/20/2008	11:43	48.15	42.76	35.34
11/20/2008	11:44	53.22	47.38	39.98
11/20/2008	11:45	54.93	48.37	41.19
11/20/2008	11:46	55.07	48.27	41.42
11/20/2008	11:47	51.18	47.13	40.42
11/20/2008	11:48	46.15	44.48	37.58
11/20/2008	11:49	45.75	45.27	36.30
11/20/2008	11:50	46.72	45.98	37.31
11/20/2008	11:51	46.41	46.18	37.21
11/20/2008	11:52	46.74	44.63	46.74
		East Stack NOx @ 3% O2	**West Stack NOx @ 3% O2**	**Preheater Stack NOx @ 3% O2**
Bias Corrected Average:		**38.0**	**37.2**	**31.1**

AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP

Jorgensen Forge Corporation

All Stacks



AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP

Run 1 Ramping STRATA Version 3.01
Operators: **KBA**
Plant Name: **Jorgesen Forge Corporation**
Site: **East Stack**
Location: **Seattle, Washington**

		Blue	Green	Red	Yellow	Pink	Lime Green
		Oxygen	Carbon Dioxide	Carbon Monoxide	CO @ 3% O_2	Nitrogen Oxides	NOx @ 3% O_2
11/20/2008	8:52:34	6.35	8.51	4.53	5.57	27.36	33.65
11/20/2008	8:53:33	6.39	8.50	4.61	5.69	28.09	34.65
11/20/2008	8:54:34	5.79	8.86	4.18	4.95	28.58	33.85
11/20/2008	8:55:33	3.63	10.07	2.97	3.08	29.30	30.36
11/20/2008	8:56:34	3.63	10.08	3.00	3.11	28.70	29.75
11/20/2008	8:57:33	3.36	10.23	3.20	3.27	28.46	29.04
11/20/2008	8:58:34	3.14	10.37	3.78	3.81	28.32	28.54
11/20/2008	8:59:34	3.38	10.20	3.45	3.52	27.98	28.58
11/20/2008	9:00:33	5.37	9.07	3.47	4.00	27.33	31.50
11/20/2008	9:01:34	5.90	8.76	3.33	3.97	27.50	32.82
11/20/2008	9:02:33	6.12	8.65	3.35	4.06	29.21	35.37
11/20/2008	9:03:34	6.15	8.62	3.34	4.05	29.82	36.19
11/20/2008	9:04:33	6.01	8.75	3.40	4.09	30.00	36.07
11/20/2008	9:05:34	3.45	10.19	3.00	3.08	30.96	31.76
11/20/2008	9:06:34	3.51	10.16	3.04	3.13	30.46	31.35
11/20/2008	9:07:33	3.42	10.23	3.07	3.14	30.53	31.27
11/20/2008	9:08:34	3.20	10.35	3.10	3.14	30.05	30.39
11/20/2008	9:09:33	3.34	10.27	3.15	3.21	29.83	30.40
11/20/2008	9:10:34	5.02	9.30	3.27	3.69	28.48	32.10
11/20/2008	9:11:34	5.90	8.81	3.05	3.64	28.64	34.17
11/20/2008	9:12:35	5.93	8.79	3.00	3.59	30.85	36.88
11/20/2008	9:13:34	6.03	8.73	3.00	3.61	31.57	38.01
11/20/2008	9:14:33	6.20	8.64	2.99	3.64	31.37	38.19
11/20/2008	9:15:34	3.87	10.02	2.94	3.09	32.15	33.78
11/20/2008	9:16:33	3.28	10.32	3.05	3.10	32.87	33.40
11/20/2008	9:17:34	3.33	10.30	3.04	3.10	32.05	32.66
11/20/2008	9:18:33	3.32	10.31	3.07	3.13	32.08	32.66
11/20/2008	9:19:35	3.53	10.18	3.02	3.11	31.83	32.79
11/20/2008	9:20:34	4.81	9.43	2.89	3.21	30.96	34.43
11/20/2008	9:21:33	5.66	8.96	2.83	3.32	30.05	35.29
11/20/2008	9:22:34	5.81	8.87	2.79	3.31	31.51	37.38
11/20/2008	9:23:34	5.91	8.82	2.71	3.24	32.46	38.75
11/20/2008	9:24:33	5.95	8.80	2.76	3.31	32.28	38.66
11/20/2008	9:25:34	4.07	9.90	2.84	3.02	32.59	34.66
11/20/2008	9:26:34	3.43	10.25	2.93	3.00	33.65	34.48
11/20/2008	9:27:33	3.31	10.32	2.95	3.00	34.40	35.01
11/20/2008	9:28:34	3.38	10.28	2.90	2.96	34.21	34.95
11/20/2008	9:29:33	3.42	10.25	2.84	2.91	34.18	35.01
11/20/2008	9:30:34	4.59	9.56	2.82	3.09	34.03	37.34
11/20/2008	9:31:33	5.45	9.08	2.71	3.14	32.47	37.63
11/20/2008	9:32:34	5.72	8.93	2.61	3.08	33.12	39.05
11/20/2008	9:33:33	5.77	8.90	2.57	3.04	33.55	39.70
11/20/2008	9:34:34	5.77	8.90	2.56	3.03	33.72	39.90
11/20/2008	9:35:33	4.32	9.76	2.68	2.89	33.69	36.37
11/20/2008	9:36:34	3.42	10.26	2.80	2.87	34.71	35.55
11/20/2008	9:37:34	3.33	10.31	2.81	2.86	35.39	36.05
11/20/2008	9:38:33	3.44	10.24	2.79	2.86	35.98	36.90
11/20/2008	9:39:35	3.52	10.19	2.75	2.83	36.52	37.61
11/20/2008	9:40:34	4.20	9.78	2.66	2.85	36.18	38.78
11/20/2008	9:41:33	5.45	9.08	2.56	2.97	33.51	38.82
11/20/2008	9:42:34	5.59	9.00	2.58	3.02	34.24	40.04
11/20/2008	9:43:33	5.70	8.94	2.53	2.98	34.97	41.19
11/20/2008	9:44:34	5.76	8.91	2.51	2.97	34.77	41.10
11/20/2008	9:45:33	4.59	9.60	2.54	2.79	35.02	38.44
11/20/2008	9:46:35	3.48	10.22	2.65	2.72	35.35	36.31
11/20/2008	9:47:34	3.38	10.28	2.64	2.70	36.04	36.81
11/20/2008	9:48:33	3.37	10.28	2.63	2.69	37.33	38.12
11/20/2008	9:49:34	3.29	10.33	2.63	2.67	36.74	37.35
11/20/2008	9:50:33	3.94	9.93	2.60	2.74	36.24	38.25
11/20/2008	9:51:34	5.43	9.09	2.45	2.83	34.43	39.84
11/20/2008	9:52:33	5.60	8.99	2.39	2.80	35.08	41.04
11/20/2008	9:53:35	5.56	9.02	2.39	2.79	36.18	42.23
11/20/2008	9:54:34	5.60	8.99	2.34	2.74	36.63	42.87
11/20/2008	9:55:33	5.08	9.32	2.38	2.69	35.93	40.65
11/20/2008	9:56:34	3.54	10.19	2.60	2.68	35.92	37.04
11/20/2008	9:57:33	3.41	10.27	2.70	2.76	36.70	37.56
11/20/2008	9:58:34	3.35	10.30	2.67	2.72	37.22	37.97
11/20/2008	9:59:33	3.52	10.20	2.71	2.79	37.49	38.62
11/20/2008	10:00:34	3.76	10.05	2.69	2.81	37.97	39.66
11/20/2008	10:01:33	5.35	9.15	2.52	2.90	36.12	41.59
11/20/2008	10:02:35	5.58	9.02	2.49	2.91	35.71	41.73
11/20/2008	10:03:34	5.64	8.99	2.48	2.91	37.27	43.71
11/20/2008	10:04:33	5.57	9.03	2.58	3.01	37.39	43.66
11/20/2008	10:05:34	5.35	9.17	2.48	2.85	37.12	42.72
11/20/2008	10:06:33	3.61	10.16	2.68	2.77	36.79	38.09
11/20/2008	10:07:34	3.50	10.23	2.73	2.81	36.03	37.07
11/20/2008	10:08:33	3.65	10.14	2.70	2.80	37.51	38.93
11/20/2008	10:09:35	3.60	10.17	2.70	2.79	37.76	39.06
11/20/2008	10:10:34	3.51	10.21	2.69	2.77	37.98	39.09
11/20/2008	10:11:33	5.09	9.30	2.53	2.86	36.33	41.14
11/20/2008	10:12:34	5.55	9.04	2.57	3.00	35.69	41.63
11/20/2008	10:13:33	5.55	9.05	2.55	2.97	37.84	44.12
11/20/2008	10:14:34	5.60	9.02	2.51	2.94	38.31	44.82
11/20/2008	10:15:33	5.61	9.02	2.49	2.91	38.42	44.96
11/20/2008	10:16:34	3.82	10.05	2.69	2.82	37.98	39.81
11/20/2008	10:17:33	3.61	10.17	2.77	2.87	36.51	37.80
11/20/2008	10:18:34	3.62	10.17	2.77	2.87	37.29	38.62
11/20/2008	10:19:34	3.22	10.41	2.85	2.89	38.47	38.95
11/20/2008	10:20:33	2.90	10.59	2.87	2.85	39.47	39.24
11/20/2008	10:21:34	4.44	9.69	2.69	2.93	38.15	41.49
11/20/2008	10:22:33	4.39	9.73	2.69	2.92	36.24	39.28
11/20/2008	10:23:34	4.46	9.70	2.73	2.97	35.50	38.65
11/20/2008	10:24:33	4.40	9.74	2.75	2.98	35.83	38.86
11/20/2008	10:25:34	4.57	9.64	2.76	3.02	35.48	38.89
11/20/2008	10:26:34	3.22	10.43	2.85	2.89	34.53	34.96
11/20/2008	10:27:33	2.92	10.61	2.93	2.92	30.90	30.75
11/20/2008	10:28:34	2.87	10.63	3.02	3.00	31.74	31.50
11/20/2008	10:29:33	2.94	10.59	2.99	2.98	33.53	33.41
11/20/2008	10:30:34	2.91	10.61	2.95	2.94	33.64	33.47
11/20/2008	10:31:33	3.57	10.21	2.92	3.02	33.23	34.32
11/20/2008	10:32:34	4.26	9.82	2.86	3.08	31.90	34.31
11/20/2008	10:33:34	4.25	9.83	2.83	3.04	35.23	37.87

11/20/2008	10:34:33	4.38	9.76	2.77	3.00	36.70	39.75
11/20/2008	10:35:34	4.39	9.75	2.83	3.07	36.82	39.93
11/20/2008	10:36:33	3.48	10.29	3.00	3.08	36.53	37.55
11/20/2008	10:37:34	3.03	10.55	3.04	3.05	32.91	32.97
11/20/2008	10:38:33	2.87	10.65	2.98	2.96	33.24	33.00
11/20/2008	10:39:34	2.92	10.62	3.03	3.02	34.44	34.29
11/20/2008	10:40:34	2.95	10.60	3.01	3.00	34.71	34.61
11/20/2008	10:41:33	3.11	10.50	2.97	2.99	34.48	34.70
11/20/2008	10:42:34	4.24	9.84	2.91	3.13	33.00	35.46
11/20/2008	10:43:33	4.33	9.79	2.85	3.08	36.16	39.06
11/20/2008	10:44:34	4.34	9.79	2.83	3.06	37.42	40.45
11/20/2008	10:45:33	4.44	9.74	2.79	3.03	37.44	40.73
11/20/2008	10:46:34	3.59	10.25	2.91	3.01	36.33	37.56
11/20/2008	10:47:34	3.02	10.58	2.99	2.99	33.34	33.38
11/20/2008	10:48:33	2.94	10.62	2.94	2.93	34.35	34.24
11/20/2008	10:49:34	3.01	10.59	2.91	2.91	35.96	35.98
11/20/2008	10:50:33	2.93	10.62	2.93	2.92	35.93	35.79
11/20/2008	10:51:34	3.10	10.53	2.92	2.94	35.80	36.00
11/20/2008	10:52:33	4.01	9.98	2.89	3.06	34.49	36.56
11/20/2008	10:53:34	4.22	9.87	2.85	3.06	37.63	40.38
11/20/2008	10:54:34	4.27	9.85	2.84	3.06	39.89	42.93
11/20/2008	10:55:33	4.30	9.83	2.76	2.98	40.07	43.20
11/20/2008	10:56:34	3.77	10.14	2.72	2.84	39.94	41.73
11/20/2008	10:57:33	3.14	10.51	2.80	2.82	36.89	37.17
11/20/2008	10:58:34	2.99	10.61	2.87	2.87	36.70	36.67
11/20/2008	10:59:33	2.98	10.61	2.84	2.84	38.13	38.09
11/20/2008	11:00:34	2.79	10.71	2.85	2.82	38.77	38.31
11/20/2008	11:01:33	3.04	10.56	2.85	2.86	37.84	37.92
11/20/2008	11:02:34	3.93	10.03	2.80	2.95	36.54	38.53
11/20/2008	11:03:33	4.20	9.87	2.75	2.95	39.13	41.95
11/20/2008	11:04:35	4.13	9.92	2.74	2.92	42.33	45.18
11/20/2008	11:05:34	4.28	9.83	2.71	2.92	42.81	46.12
11/20/2008	11:06:33	4.00	10.00	2.73	2.89	42.49	45.01
11/20/2008	11:07:34	3.07	10.54	2.88	2.89	39.65	39.81
11/20/2008	11:08:33	2.95	10.62	2.87	2.86	37.88	37.77
11/20/2008	11:09:34	2.99	10.59	2.86	2.86	39.82	39.79
11/20/2008	11:10:33	2.81	10.69	2.88	2.85	39.91	39.49
11/20/2008	11:11:35	3.00	10.58	2.85	2.85	39.89	39.88
11/20/2008	11:12:34	3.76	10.12	2.74	2.86	38.43	40.13
11/20/2008	11:13:33	4.21	9.85	2.70	2.90	40.69	43.65
11/20/2008	11:14:34	4.17	9.88	2.75	2.94	44.31	47.41
11/20/2008	11:15:33	4.19	9.87	2.75	2.95	44.86	48.04
11/20/2008	11:16:34	4.18	9.89	2.74	2.93	44.32	47.44
11/20/2008	11:17:33	3.25	10.41	2.89	2.93	42.23	42.83
11/20/2008	11:18:35	3.02	10.56	2.91	2.91	39.83	39.86
11/20/2008	11:19:34	3.08	10.52	2.92	2.93	41.43	41.62
11/20/2008	11:20:33	3.13	10.48	2.87	2.89	43.48	43.79
11/20/2008	11:21:34	2.96	10.58	2.81	2.80	42.56	42.46
11/20/2008	11:22:33	3.69	10.15	2.77	2.88	40.23	41.85
11/20/2008	11:23:34	4.17	9.86	2.74	2.93	41.35	44.25
11/20/2008	11:24:33	4.25	9.82	2.69	2.89	46.48	49.97
11/20/2008	11:25:35	4.29	9.80	2.71	2.92	47.23	50.89
11/20/2008	11:26:34	4.29	9.80	2.71	2.92	45.93	49.50
11/20/2008	11:27:33	3.33	10.37	2.86	2.91	44.73	45.57
11/20/2008	11:28:34	3.10	10.52	2.86	2.88	42.22	42.45
11/20/2008	11:29:33	2.85	10.66	2.92	2.90	43.46	43.10
11/20/2008	11:30:34	3.04	10.55	2.94	2.95	45.18	45.27
11/20/2008	11:31:33	2.92	10.61	2.91	2.90	43.69	43.51
11/20/2008	11:32:35	3.54	10.24	2.88	2.97	42.69	44.02
11/20/2008	11:33:34	4.14	9.89	2.79	2.98	43.12	46.05
11/20/2008	11:34:33	4.32	9.78	2.80	3.02	48.01	51.83
11/20/2008	11:35:34	4.29	9.80	2.86	3.08	49.59	53.44
11/20/2008	11:36:33	4.29	9.80	2.84	3.06	48.55	52.31
11/20/2008	11:37:34	3.46	10.30	2.92	3.00	47.61	48.87
11/20/2008	11:38:33	3.09	10.52	3.03	3.04	44.52	44.74
11/20/2008	11:39:34	3.04	10.56	3.07	3.08	45.37	45.47
11/20/2008	11:40:33	2.94	10.61	3.07	3.06	46.05	45.91
11/20/2008	11:41:34	2.95	10.60	3.01	3.00	45.84	45.71
11/20/2008	11:42:34	3.31	10.38	3.03	3.08	44.01	44.78
11/20/2008	11:43:35	4.22	9.84	2.92	3.13	44.87	48.15
11/20/2008	11:44:34	4.13	9.89	2.94	3.14	49.85	53.22
11/20/2008	11:45:33	4.28	9.81	2.87	3.09	51.01	54.93
11/20/2008	11:46:34	4.34	9.76	2.86	3.09	50.94	55.07
11/20/2008	11:47:33	3.57	10.24	2.95	3.05	49.55	51.18
11/20/2008	11:48:34	3.07	10.53	3.07	3.08	45.96	46.15
11/20/2008	11:49:33	2.95	10.61	3.11	3.10	45.88	45.75
11/20/2008	11:50:34	2.90	10.63	3.12	3.10	46.98	46.72
11/20/2008	11:51:33	2.91	10.62	3.14	3.12	46.65	46.41
11/20/2008	11:52:35	3.28	10.39	3.09	3.14	46.01	46.74
		O_2 E %	**CO_2 E %**	**CO E ppm**	**CO E ppm @ 3% O_2**	**NOx E ppm**	**NOx E ppm @ 3% O_2**
Average:		4.05	9.92	2.87	3.06	37.08	39.42

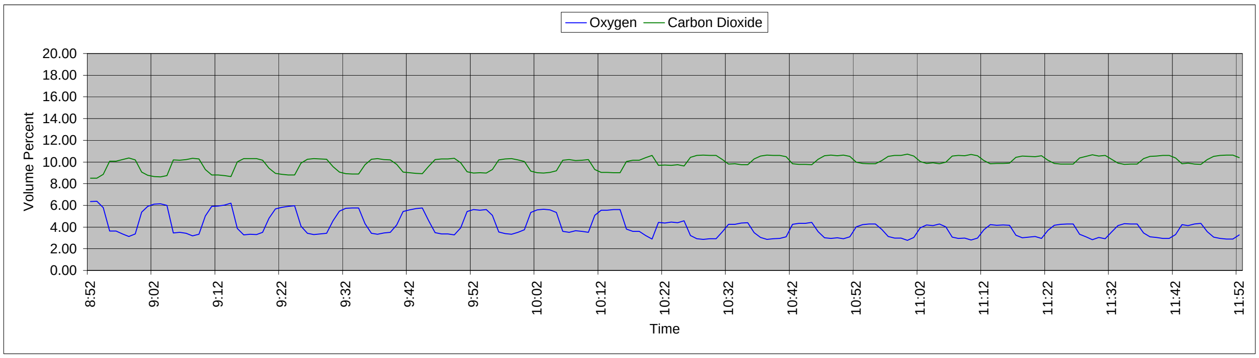
Any negative values are assigned a value of zero (0.00).

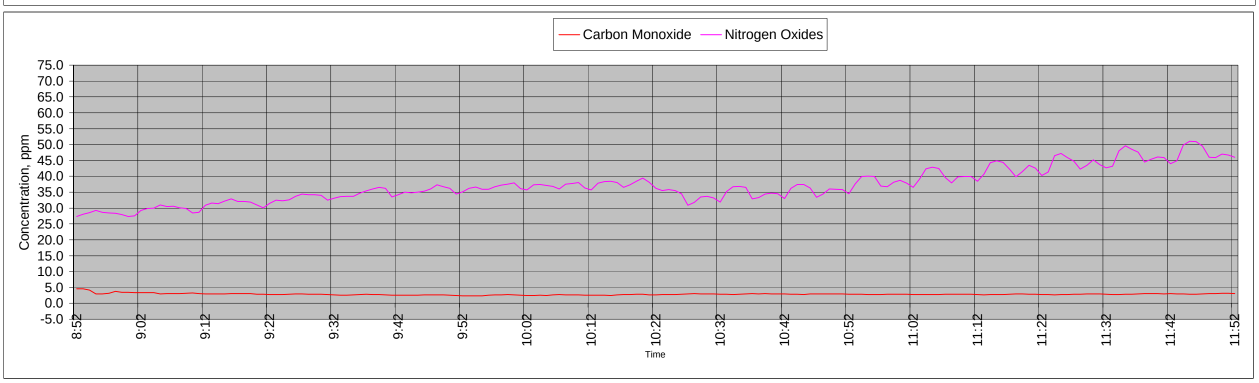
	O_2 E	CO_2 E	CO E	CO E ppm @ 3% O_2	NOx E	NOx E ppm @ 3% O_2
Initial Zero	0.040	0.189	0.25		0.83	
Initial Span	11.907	12.336	54.46		53.56	
Post Zero	0.034	0.173	0.18		1.01	
Post Span	11.989	12.377	53.60		56.23	
Avg. Zero	0.04	0.18	0.22		0.92	
Avg. Span	11.95	12.36	54.03		54.90	
Span Gas	12.100	12.100	54.00		53.30	
Bias Corrected Average:	**4.1**	**9.7**	**2.7**	**2.8**	**35.7**	**38.0**

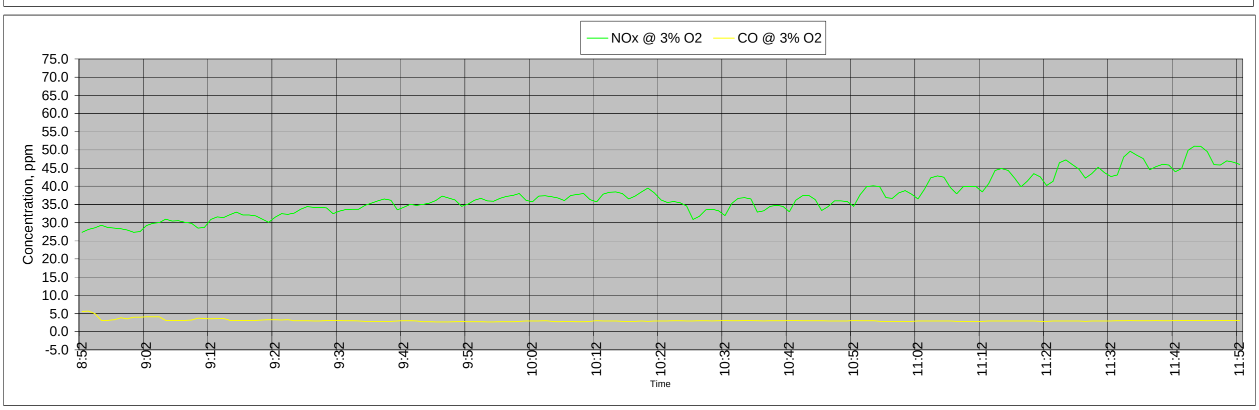
AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP

Jorgensen Forge Corporation

East Stack







AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP

Run 1 Ramping STRATA Version 3.01
Operators: **KBA**
Plant Name: **Jorgesen Forge Corporation**
Site: **West Stack**
Location: **Seattle, Washington**

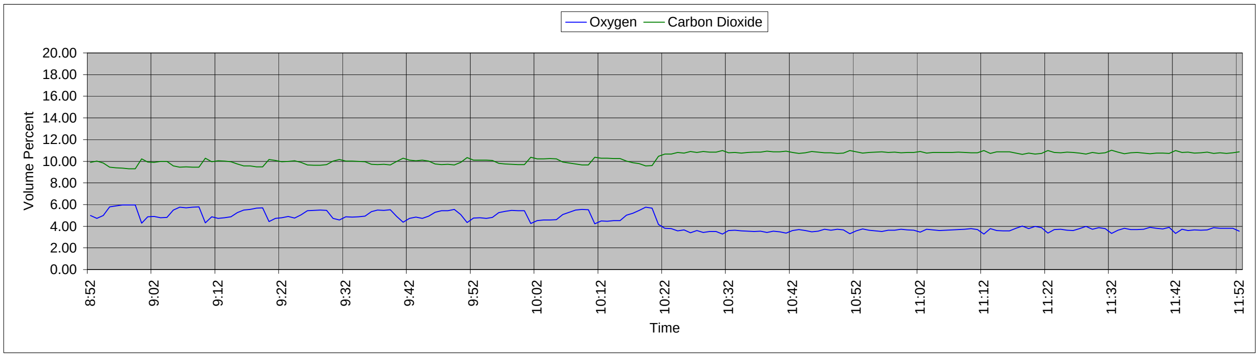
		Blue	Green	Red	Yellow	Pink	Lime Green
		Oxygen	Carbon Dioxide	Carbon Monoxide	CO @ 3% O_2	Nitrogen Oxides	NOx @ 3% O_2
11/20/2008	8:52:34	4.98	9.89	0.32	0.36	28.60	32.16
11/20/2008	8:53:33	4.74	10.01	0.20	0.22	29.65	32.84
11/20/2008	8:54:34	5.00	9.84	0.18	0.20	29.97	33.73
11/20/2008	8:55:33	5.79	9.45	0.74	0.88	27.10	32.09
11/20/2008	8:56:34	5.88	9.40	1.21	1.44	24.06	28.67
11/20/2008	8:57:33	5.95	9.36	1.21	1.45	23.68	28.36
11/20/2008	8:58:34	5.95	9.32	1.21	1.45	23.71	28.39
11/20/2008	8:59:34	5.96	9.30	1.17	1.40	23.65	28.33
11/20/2008	9:00:33	4.29	10.23	0.42	0.45	25.72	27.71
11/20/2008	9:01:34	4.88	9.94	0.00	0.00	28.17	31.48
11/20/2008	9:02:33	4.91	9.88	0.00	0.00	30.23	33.84
11/20/2008	9:03:34	4.80	9.99	0.00	0.00	30.88	34.33
11/20/2008	9:04:33	4.83	9.98	0.00	0.00	31.25	34.81
11/20/2008	9:05:34	5.49	9.56	0.06	0.07	29.55	34.33
11/20/2008	9:06:34	5.77	9.44	0.14	0.17	25.98	30.73
11/20/2008	9:07:33	5.71	9.48	0.19	0.22	25.99	30.63
11/20/2008	9:08:34	5.76	9.45	0.25	0.30	25.54	30.19
11/20/2008	9:09:33	5.78	9.44	0.26	0.31	25.37	30.04
11/20/2008	9:10:34	4.30	10.27	0.07	0.08	25.48	27.48
11/20/2008	9:11:34	4.87	9.95	0.00	0.00	29.39	32.82
11/20/2008	9:12:35	4.72	10.05	0.00	0.00	31.56	34.91
11/20/2008	9:13:34	4.80	10.01	0.00	0.00	32.19	35.79
11/20/2008	9:14:33	4.88	9.97	0.00	0.00	32.38	36.18
11/20/2008	9:15:34	5.26	9.75	0.00	0.00	31.74	36.32
11/20/2008	9:16:33	5.50	9.59	0.00	0.00	28.13	32.70
11/20/2008	9:17:34	5.57	9.58	0.00	0.00	27.19	31.74
11/20/2008	9:18:33	5.68	9.49	0.00	0.00	27.15	31.93
11/20/2008	9:19:35	5.70	9.49	0.00	0.00	26.81	31.58
11/20/2008	9:20:34	4.44	10.15	0.00	0.00	27.34	29.74
11/20/2008	9:21:33	4.74	10.07	0.00	0.00	29.84	33.04
11/20/2008	9:22:34	4.79	9.96	0.00	0.00	31.45	34.95
11/20/2008	9:23:34	4.89	10.00	0.00	0.00	32.50	36.35
11/20/2008	9:24:33	4.77	10.05	0.00	0.00	31.96	35.46
11/20/2008	9:25:34	5.04	9.89	0.00	0.00	31.72	35.80
11/20/2008	9:26:34	5.44	9.67	0.00	0.00	29.09	33.68
11/20/2008	9:27:33	5.47	9.63	0.00	0.00	29.63	34.37
11/20/2008	9:28:34	5.50	9.63	0.00	0.00	29.02	33.72
11/20/2008	9:29:33	5.48	9.68	0.00	0.00	29.03	33.70
11/20/2008	9:30:34	4.74	10.03	0.00	0.00	29.09	32.22
11/20/2008	9:31:33	4.59	10.18	0.00	0.00	31.32	34.37
11/20/2008	9:32:34	4.87	10.01	0.00	0.00	32.53	36.31
11/20/2008	9:33:33	4.83	10.02	0.00	0.00	33.12	36.90
11/20/2008	9:34:34	4.88	10.00	0.00	0.00	33.37	37.28
11/20/2008	9:35:33	4.95	9.96	0.00	0.00	32.98	37.00
11/20/2008	9:36:34	5.36	9.73	0.00	0.00	30.54	35.18
11/20/2008	9:37:34	5.49	9.68	0.00	0.00	30.60	35.53
11/20/2008	9:38:33	5.46	9.72	0.00	0.00	31.02	35.95
11/20/2008	9:39:35	5.52	9.65	0.00	0.00	31.28	36.41
11/20/2008	9:40:34	4.90	9.98	0.00	0.00	31.01	34.69
11/20/2008	9:41:33	4.39	10.28	0.00	0.00	32.49	35.21
11/20/2008	9:42:34	4.72	10.12	0.00	0.00	33.84	37.44
11/20/2008	9:43:33	4.86	10.03	0.00	0.00	34.40	38.38
11/20/2008	9:44:34	4.74	10.11	0.00	0.00	34.10	37.76
11/20/2008	9:45:33	4.92	10.00	0.00	0.00	34.50	38.65
11/20/2008	9:46:35	5.29	9.74	0.00	0.00	31.69	36.34
11/20/2008	9:47:34	5.43	9.70	0.00	0.00	31.68	36.66
11/20/2008	9:48:33	5.43	9.72	0.00	0.00	32.41	37.49
11/20/2008	9:49:34	5.54	9.66	0.00	0.00	31.80	37.07
11/20/2008	9:50:33	5.07	9.90	0.00	0.00	31.34	35.43
11/20/2008	9:51:34	4.33	10.35	0.00	0.00	32.59	35.20
11/20/2008	9:52:33	4.77	10.11	0.00	0.00	34.91	38.73
11/20/2008	9:53:35	4.79	10.10	0.00	0.00	35.68	39.63
11/20/2008	9:54:34	4.74	10.10	0.00	0.00	36.08	39.97
11/20/2008	9:55:33	4.83	10.07	0.00	0.00	35.15	39.15
11/20/2008	9:56:34	5.25	9.82	0.00	0.00	32.94	37.67
11/20/2008	9:57:33	5.39	9.74	0.00	0.00	32.96	38.04
11/20/2008	9:58:34	5.45	9.72	0.00	0.00	32.62	37.80
11/20/2008	9:59:33	5.42	9.70	0.00	0.00	32.93	38.08
11/20/2008	10:00:34	5.42	9.70	0.00	0.00	33.06	38.24
11/20/2008	10:01:33	4.25	10.36	0.00	0.00	33.73	36.26
11/20/2008	10:02:35	4.51	10.23	0.00	0.00	35.61	38.90
11/20/2008	10:03:34	4.59	10.21	0.00	0.00	36.74	40.31
11/20/2008	10:04:33	4.58	10.24	0.00	0.00	36.96	40.54
11/20/2008	10:05:34	4.60	10.22	0.00	0.00	36.70	40.31
11/20/2008	10:06:33	5.07	9.93	0.00	0.00	34.30	38.79
11/20/2008	10:07:34	5.27	9.83	0.00	0.00	32.29	36.99
11/20/2008	10:08:33	5.50	9.74	0.00	0.00	33.23	38.62
11/20/2008	10:09:35	5.54	9.67	0.00	0.00	33.33	38.85
11/20/2008	10:10:34	5.52	9.67	0.00	0.00	33.26	38.72
11/20/2008	10:11:33	4.22	10.37	0.00	0.00	32.97	35.37
11/20/2008	10:12:34	4.48	10.28	0.00	0.00	35.33	38.51
11/20/2008	10:13:33	4.46	10.28	0.00	0.00	37.87	41.23
11/20/2008	10:14:34	4.52	10.25	0.00	0.00	38.23	41.76
11/20/2008	10:15:33	4.52	10.26	0.00	0.00	38.13	41.66
11/20/2008	10:16:34	5.02	10.01	0.00	0.00	35.91	40.47
11/20/2008	10:17:33	5.21	9.87	0.00	0.00	33.00	37.66
11/20/2008	10:18:34	5.45	9.77	0.00	0.00	33.82	39.19
11/20/2008	10:19:34	5.75	9.58	0.00	0.00	33.50	39.59
11/20/2008	10:20:33	5.68	9.61	0.00	0.00	33.43	39.31
11/20/2008	10:21:34	4.17	10.44	0.00	0.00	33.84	36.21
11/20/2008	10:22:33	3.83	10.67	0.00	0.00	34.25	35.90
11/20/2008	10:23:34	3.79	10.66	0.00	0.00	33.66	35.22
11/20/2008	10:24:33	3.58	10.82	0.00	0.00	33.81	34.95
11/20/2008	10:25:34	3.65	10.77	0.00	0.00	33.55	34.82
11/20/2008	10:26:34	3.40	10.89	0.00	0.00	32.34	33.08
11/20/2008	10:27:33	3.61	10.80	0.00	0.00	28.72	29.74
11/20/2008	10:28:34	3.41	10.90	0.00	0.00	30.86	31.59
11/20/2008	10:29:33	3.52	10.84	0.00	0.00	32.34	33.31
11/20/2008	10:30:34	3.53	10.85	0.00	0.00	32.12	33.10
11/20/2008	10:31:33	3.27	11.00	0.00	0.00	31.24	31.72
11/20/2008	10:32:34	3.61	10.79	0.00	0.00	29.91	30.97
11/20/2008	10:33:34	3.63	10.80	0.00	0.00	33.63	34.85

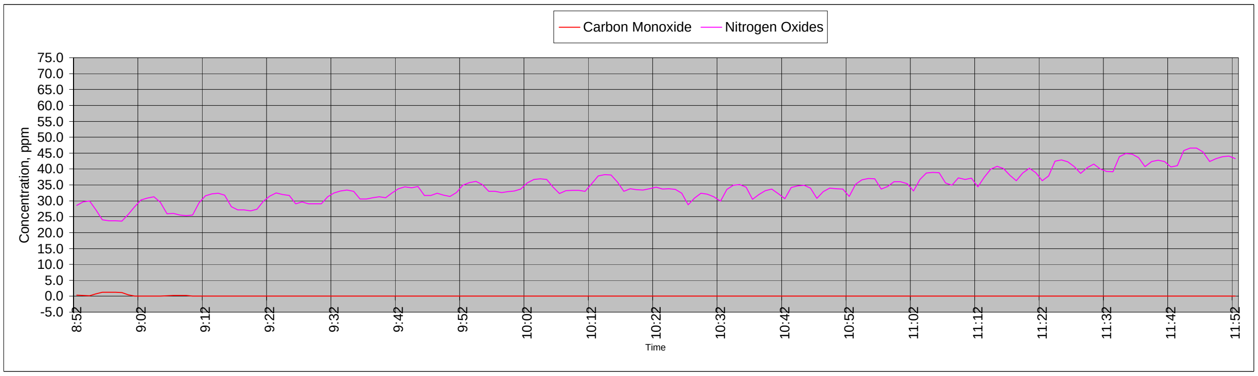
11/20/2008	10:34:33	3.58	10.76	0.00	0.00	34.86	36.03
11/20/2008	10:35:34	3.55	10.81	0.00	0.00	35.14	36.26
11/20/2008	10:36:33	3.50	10.83	0.00	0.00	34.25	35.24
11/20/2008	10:37:34	3.53	10.85	0.00	0.00	30.42	31.36
11/20/2008	10:38:33	3.43	10.94	0.00	0.00	31.95	32.73
11/20/2008	10:39:34	3.55	10.88	0.00	0.00	33.14	34.20
11/20/2008	10:40:34	3.48	10.88	0.00	0.00	33.72	34.65
11/20/2008	10:41:33	3.36	10.94	0.00	0.00	32.26	32.92
11/20/2008	10:42:34	3.60	10.81	0.00	0.00	30.69	31.75
11/20/2008	10:43:33	3.70	10.72	0.00	0.00	34.19	35.58
11/20/2008	10:44:34	3.62	10.79	0.00	0.00	34.67	35.91
11/20/2008	10:45:33	3.49	10.89	0.00	0.00	34.87	35.86
11/20/2008	10:46:34	3.55	10.85	0.00	0.00	33.98	35.05
11/20/2008	10:47:34	3.72	10.79	0.00	0.00	30.79	32.07
11/20/2008	10:48:33	3.63	10.78	0.00	0.00	32.84	34.03
11/20/2008	10:49:34	3.74	10.72	0.00	0.00	34.00	35.46
11/20/2008	10:50:33	3.67	10.74	0.00	0.00	33.79	35.11
11/20/2008	10:51:34	3.32	11.00	0.00	0.00	33.71	34.33
11/20/2008	10:52:33	3.57	10.88	0.00	0.00	31.36	32.40
11/20/2008	10:53:34	3.76	10.74	0.00	0.00	35.20	36.75
11/20/2008	10:54:34	3.62	10.80	0.00	0.00	36.64	37.96
11/20/2008	10:55:33	3.56	10.83	0.00	0.00	37.00	38.20
11/20/2008	10:56:34	3.53	10.86	0.00	0.00	36.95	38.07
11/20/2008	10:57:33	3.62	10.83	0.00	0.00	33.74	34.95
11/20/2008	10:58:34	3.63	10.84	0.00	0.00	34.46	35.71
11/20/2008	10:59:33	3.72	10.80	0.00	0.00	35.96	37.47
11/20/2008	11:00:34	3.67	10.83	0.00	0.00	35.98	37.39
11/20/2008	11:01:33	3.64	10.80	0.00	0.00	35.44	36.76
11/20/2008	11:02:34	3.45	10.91	0.00	0.00	33.12	33.97
11/20/2008	11:03:33	3.73	10.75	0.00	0.00	36.71	38.27
11/20/2008	11:04:35	3.65	10.80	0.00	0.00	38.76	40.23
11/20/2008	11:05:34	3.60	10.82	0.00	0.00	38.95	40.29
11/20/2008	11:06:33	3.64	10.80	0.00	0.00	38.84	40.27
11/20/2008	11:07:34	3.68	10.83	0.00	0.00	35.59	36.98
11/20/2008	11:08:33	3.69	10.84	0.00	0.00	34.93	36.33
11/20/2008	11:09:34	3.74	10.80	0.00	0.00	37.26	38.86
11/20/2008	11:10:33	3.77	10.77	0.00	0.00	36.67	38.33
11/20/2008	11:11:35	3.70	10.79	0.00	0.00	37.08	38.60
11/20/2008	11:12:34	3.29	10.99	0.00	0.00	34.38	34.94
11/20/2008	11:13:33	3.77	10.74	0.00	0.00	37.41	39.09
11/20/2008	11:14:34	3.59	10.86	0.00	0.00	39.98	41.35
11/20/2008	11:15:33	3.59	10.87	0.00	0.00	40.83	42.21
11/20/2008	11:16:34	3.57	10.88	0.00	0.00	40.16	41.48
11/20/2008	11:17:33	3.81	10.74	0.00	0.00	37.99	39.80
11/20/2008	11:18:35	4.01	10.64	0.00	0.00	36.30	38.47
11/20/2008	11:19:34	3.77	10.76	0.00	0.00	38.73	40.46
11/20/2008	11:20:33	4.00	10.68	0.00	0.00	40.27	42.65
11/20/2008	11:21:34	3.88	10.73	0.00	0.00	38.79	40.81
11/20/2008	11:22:33	3.36	10.99	0.00	0.00	36.30	37.04
11/20/2008	11:23:34	3.71	10.80	0.00	0.00	37.84	39.40
11/20/2008	11:24:33	3.72	10.78	0.00	0.00	42.48	44.26
11/20/2008	11:25:35	3.64	10.83	0.00	0.00	42.87	44.45
11/20/2008	11:26:34	3.61	10.81	0.00	0.00	42.22	43.70
11/20/2008	11:27:33	3.80	10.74	0.00	0.00	40.75	42.65
11/20/2008	11:28:34	3.98	10.65	0.00	0.00	38.61	40.85
11/20/2008	11:29:33	3.73	10.81	0.00	0.00	40.46	42.18
11/20/2008	11:30:34	3.87	10.73	0.00	0.00	41.59	43.72
11/20/2008	11:31:33	3.77	10.77	0.00	0.00	40.08	41.89
11/20/2008	11:32:35	3.33	11.01	0.00	0.00	39.20	39.93
11/20/2008	11:33:34	3.65	10.83	0.00	0.00	39.12	40.59
11/20/2008	11:34:33	3.82	10.70	0.00	0.00	43.85	45.95
11/20/2008	11:35:34	3.70	10.78	0.00	0.00	44.84	46.65
11/20/2008	11:36:33	3.70	10.80	0.00	0.00	44.67	46.48
11/20/2008	11:37:34	3.72	10.76	0.00	0.00	43.54	45.36
11/20/2008	11:38:33	3.89	10.71	0.00	0.00	40.77	42.89
11/20/2008	11:39:34	3.80	10.74	0.00	0.00	42.36	44.35
11/20/2008	11:40:33	3.76	10.77	0.00	0.00	42.80	44.70
11/20/2008	11:41:34	3.89	10.73	0.00	0.00	42.37	44.59
11/20/2008	11:42:34	3.35	10.98	0.00	0.00	40.69	41.50
11/20/2008	11:43:35	3.74	10.80	0.00	0.00	41.00	42.76
11/20/2008	11:44:34	3.60	10.84	0.00	0.00	45.79	47.38
11/20/2008	11:45:33	3.67	10.75	0.00	0.00	46.55	48.37
11/20/2008	11:46:34	3.64	10.78	0.00	0.00	46.56	48.27
11/20/2008	11:47:33	3.66	10.83	0.00	0.00	45.38	47.13
11/20/2008	11:48:34	3.87	10.73	0.00	0.00	42.31	44.48
11/20/2008	11:49:33	3.80	10.78	0.00	0.00	43.25	45.27
11/20/2008	11:50:34	3.82	10.72	0.00	0.00	43.88	45.98
11/20/2008	11:51:33	3.81	10.78	0.00	0.00	44.10	46.18
11/20/2008	11:52:35	3.55	10.87	0.00	0.00	43.25	44.63
		O_2 E %	**CO_2 E %**	**CO E ppm**	**CO E ppm @ 3% O_2**	**NOx E ppm**	**NOx E ppm @ 3% O_2**
Average:		4.36	10.35	0.04	0.05	34.42	37.18

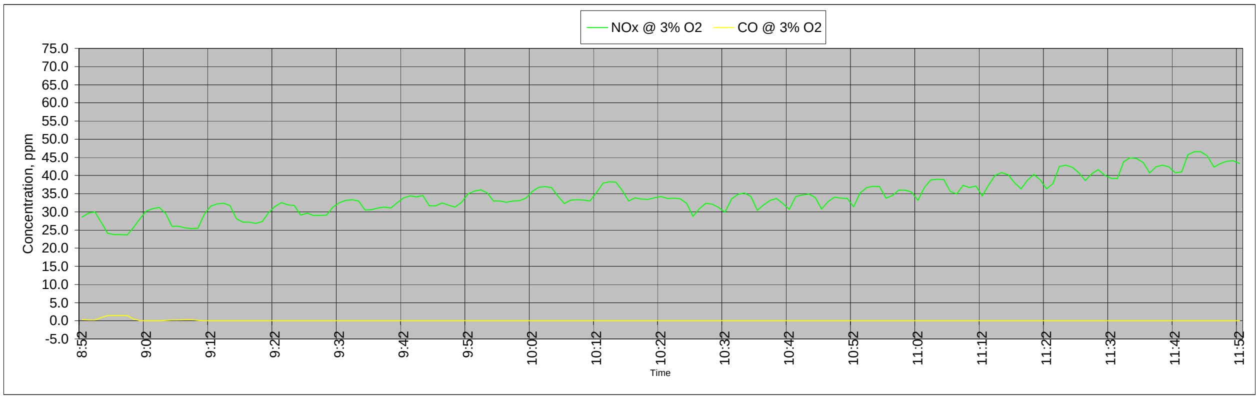
Any negative values are assigned a value of zero (0.00).

Initial Zero	0.371	-0.047	0.04		0.24	
Initial Span	12.021	12.310	52.98		52.84	
Post Zero	0.145	0.072	0.01		0.56	
Post Span	12.037	12.650	53.41		52.54	
Avg. Zero	0.26	0.01	0.03		0.40	
Avg. Span	12.03	12.48	53.20		52.69	
Span Gas	12.100	12.100	54.00		53.30	
Bias Corrected Average:	**4.2**	**10.0**	**0.0**	**0.0**	**34.7**	**37.2**

AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP
Jorgensen Forge Corporation
West Stack







AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP

Run 1 Ramping STRATA Version 3.01
Operators: **KBA**
Plant Name: **Jorgensen Forge Corporation**
Site: **Preheater Stack**
Location: **Seattle, Washington**

		Blue	Green	Red	Yellow	Pink	Lime Green
		Oxygen	Carbon Dioxide	Carbon Monoxide	CO @ 3% O_2	Nitrogen Oxides	NOx @ 3% O_2
11/20/2008	8:51:32	5.56	8.09	8.85	10.33	21.51	25.10
11/20/2008	8:52:32	5.77	8.01	8.73	10.33	22.28	26.36
11/20/2008	8:53:33	5.87	7.94	8.38	9.98	22.62	26.93
11/20/2008	8:54:31	9.86	5.94	8.55	13.87	16.16	26.21
11/20/2008	8:55:32	9.04	6.30	21.77	32.86	15.20	22.94
11/20/2008	8:56:32	8.80	6.43	24.58	36.37	15.23	22.54
11/20/2008	8:57:33	8.89	6.39	23.58	35.15	15.31	22.82
11/20/2008	8:58:31	9.06	6.29	22.77	34.43	15.09	22.82
11/20/2008	8:59:32	10.41	5.62	18.54	31.64	13.73	23.43
11/20/2008	9:00:32	5.57	8.05	8.78	10.25	20.43	23.85
11/20/2008	9:01:33	5.58	8.07	8.75	10.22	22.61	26.41
11/20/2008	9:02:31	5.67	8.03	8.58	10.09	23.20	27.27
11/20/2008	9:03:32	5.84	7.92	8.56	10.18	23.30	27.70
11/20/2008	9:04:32	9.15	6.30	7.99	12.18	18.02	27.46
11/20/2008	9:05:33	9.59	5.97	18.98	30.04	15.36	24.31
11/20/2008	9:06:31	9.05	6.31	23.13	34.93	16.15	24.39
11/20/2008	9:07:32	8.91	6.39	22.78	34.01	16.03	23.93
11/20/2008	9:08:32	8.95	6.35	22.27	33.37	15.83	23.72
11/20/2008	9:09:33	10.58	5.54	20.55	35.63	13.54	23.47
11/20/2008	9:10:31	6.14	7.77	9.54	11.57	20.35	24.69
11/20/2008	9:11:32	5.83	7.98	8.55	10.15	23.40	27.79
11/20/2008	9:12:33	5.87	7.99	8.09	9.64	24.14	28.76
11/20/2008	9:13:31	5.90	7.97	8.32	9.93	24.17	28.85
11/20/2008	9:14:32	8.36	6.75	7.54	10.77	20.55	29.34
11/20/2008	9:15:32	9.62	6.01	16.04	25.44	16.57	26.28
11/20/2008	9:16:33	8.88	6.43	22.69	33.80	16.93	25.22
11/20/2008	9:17:31	8.73	6.55	21.88	32.19	17.22	25.34
11/20/2008	9:18:32	8.71	6.60	21.11	31.00	17.34	25.46
11/20/2008	9:19:32	10.02	5.92	19.73	32.47	15.31	25.19
11/20/2008	9:20:33	6.65	7.56	10.16	12.77	20.71	26.02
11/20/2008	9:21:31	5.60	8.13	8.88	10.39	23.78	27.83
11/20/2008	9:22:32	5.62	8.16	8.62	10.10	25.03	29.32
11/20/2008	9:23:33	5.45	8.23	8.65	10.02	25.08	29.05
11/20/2008	9:24:33	7.17	7.41	7.81	10.18	22.27	29.03
11/20/2008	9:25:32	9.73	6.04	13.24	21.22	16.66	26.70
11/20/2008	9:26:32	8.83	6.51	21.26	31.54	18.23	27.04
11/20/2008	9:27:33	8.52	6.70	20.09	29.04	18.84	27.23
11/20/2008	9:28:31	8.47	6.71	19.53	28.12	18.89	27.20
11/20/2008	9:29:32	9.32	6.27	18.32	28.31	17.54	27.10
11/20/2008	9:30:32	7.55	7.13	10.83	14.52	20.55	27.55
11/20/2008	9:31:33	5.49	8.24	10.04	11.66	24.76	28.75
11/20/2008	9:32:32	5.52	8.20	9.31	10.84	25.47	29.65
11/20/2008	9:33:32	5.50	8.18	8.53	9.91	25.95	30.16
11/20/2008	9:34:33	6.11	7.87	8.07	9.77	24.69	29.88
11/20/2008	9:35:31	9.88	5.94	10.18	16.53	17.28	28.07
11/20/2008	9:36:32	8.64	6.58	18.72	27.33	18.97	27.69
11/20/2008	9:37:32	8.37	6.74	17.95	25.63	19.86	28.36
11/20/2008	9:38:33	8.44	6.69	17.03	24.46	20.30	29.16
11/20/2008	9:39:31	8.52	6.62	16.06	23.21	20.27	29.30
11/20/2008	9:40:32	8.49	6.59	10.71	15.45	19.39	27.96
11/20/2008	9:41:32	5.57	8.10	10.04	11.72	25.29	29.53
11/20/2008	9:42:33	5.47	8.15	8.90	10.33	26.65	30.92
11/20/2008	9:43:31	5.30	8.26	7.33	8.41	26.96	30.93
11/20/2008	9:44:32	5.48	8.16	6.75	7.84	26.96	31.29
11/20/2008	9:45:32	9.67	6.04	7.69	12.26	18.18	28.99
11/20/2008	9:46:33	8.34	6.71	16.14	23.00	19.87	28.32
11/20/2008	9:47:31	8.30	6.77	15.60	22.16	20.98	29.80
11/20/2008	9:48:32	8.14	6.86	14.40	20.20	21.21	29.76
11/20/2008	9:49:32	8.22	6.85	13.86	19.56	20.92	29.52
11/20/2008	9:50:33	8.89	6.45	12.56	18.72	19.50	29.06
11/20/2008	9:51:31	5.65	8.11	9.09	10.67	26.10	30.63
11/20/2008	9:52:32	5.51	8.18	7.36	8.56	28.00	32.57
11/20/2008	9:53:33	5.43	8.24	6.10	7.06	28.72	33.23
11/20/2008	9:54:31	5.37	8.20	4.97	5.73	28.61	32.98
11/20/2008	9:55:32	9.13	6.36	6.19	9.41	20.07	30.51
11/20/2008	9:56:32	8.19	6.82	15.78	22.21	20.33	28.62
11/20/2008	9:57:33	8.05	6.91	14.97	20.85	21.50	29.95
11/20/2008	9:58:31	7.93	6.94	12.98	17.91	22.02	30.38
11/20/2008	9:59:32	7.94	6.95	11.75	16.23	22.72	31.39
11/20/2008	10:00:32	9.31	6.21	9.04	13.96	20.03	30.92
11/20/2008	10:01:33	5.67	8.06	6.28	7.38	26.85	31.55
11/20/2008	10:02:31	5.64	8.07	4.63	5.43	28.98	34.00
11/20/2008	10:03:32	5.55	8.11	3.27	3.81	29.68	34.60
11/20/2008	10:04:32	5.43	8.14	2.58	2.99	29.71	34.38
11/20/2008	10:05:33	8.61	6.55	2.80	4.08	22.35	32.56
11/20/2008	10:06:31	7.69	7.00	12.51	16.95	20.70	28.04
11/20/2008	10:07:32	7.67	7.05	12.24	16.56	22.28	30.14
11/20/2008	10:08:32	7.73	7.03	11.21	15.24	22.76	30.93
11/20/2008	10:09:33	7.74	6.99	9.90	13.47	23.31	31.71
11/20/2008	10:10:31	9.31	6.19	7.89	12.19	20.11	31.06
11/20/2008	10:11:32	5.67	7.96	3.73	4.38	26.77	31.45
11/20/2008	10:12:33	5.66	8.01	2.39	2.81	29.88	35.09
11/20/2008	10:13:31	5.48	8.10	1.58	1.83	35.10	40.75
11/20/2008	10:14:32	5.56	8.08	1.10	1.28	32.50	37.91
11/20/2008	10:15:32	8.12	6.81	0.87	1.22	25.23	35.35
11/20/2008	10:16:33	7.70	6.96	9.73	13.20	21.68	29.40
11/20/2008	10:17:31	7.43	7.14	11.13	14.79	23.00	30.57
11/20/2008	10:18:32	7.72	7.00	10.17	13.81	23.03	31.27
11/20/2008	10:19:32	8.23	6.77	15.00	21.20	22.06	31.17
11/20/2008	10:20:33	9.58	6.08	14.31	22.63	19.66	31.09
11/20/2008	10:21:31	6.23	7.73	5.80	7.08	25.99	31.71
11/20/2008	10:22:32	5.31	8.22	3.75	4.31	26.42	30.34
11/20/2008	10:23:33	5.16	8.30	2.38	2.71	27.19	30.91
11/20/2008	10:24:33	5.21	8.30	1.75	2.00	26.77	30.54
11/20/2008	10:25:32	7.06	7.39	1.33	1.72	23.31	30.16
11/20/2008	10:26:32	7.74	7.04	7.22	9.82	18.00	24.48
11/20/2008	10:27:33	7.16	7.35	10.94	14.25	18.97	24.72
11/20/2008	10:28:31	7.36	7.29	9.07	11.99	20.25	26.77
11/20/2008	10:29:32	7.37	7.25	8.11	10.73	20.52	27.14
11/20/2008	10:30:32	8.57	6.65	7.34	10.65	18.80	27.29
11/20/2008	10:31:33	5.89	7.91	3.64	4.34	22.21	26.48
11/20/2008	10:32:31	5.29	8.30	2.35	2.69	26.05	29.86

		O_2 E %	CO_2 E %	CO E ppm	CO E ppm @ 3% O_2	NOx E ppm	NOx E ppm @ 3% O_2
11/20/2008	10:33:32	5.16	8.33	1.36	1.55	27.58	31.36
11/20/2008	10:34:32	5.19	8.34	0.73	0.83	27.93	31.82
11/20/2008	10:35:33	6.39	7.70	0.56	0.69	25.71	31.72
11/20/2008	10:36:31	8.25	6.78	4.78	6.76	18.85	26.67
11/20/2008	10:37:32	7.18	7.29	8.98	11.72	20.18	26.33
11/20/2008	10:38:33	7.20	7.34	7.74	10.11	21.01	27.45
11/20/2008	10:39:31	7.34	7.24	6.51	8.59	21.29	28.10
11/20/2008	10:40:32	7.86	7.00	5.48	7.52	20.43	28.03
11/20/2008	10:41:32	6.87	7.39	2.55	3.25	21.47	27.39
11/20/2008	10:42:33	5.17	8.29	1.27	1.44	26.74	30.42
11/20/2008	10:43:31	4.83	8.42	0.41	0.46	28.51	31.76
11/20/2008	10:44:32	4.82	8.50	0.00	0.00	28.57	31.79
11/20/2008	10:45:32	5.11	8.33	0.00	0.00	27.82	31.54
11/20/2008	10:46:33	7.82	7.04	1.72	2.35	20.39	27.90
11/20/2008	10:47:31	6.75	7.54	5.40	6.83	21.92	27.74
11/20/2008	10:48:32	6.72	7.60	4.86	6.13	23.34	29.46
11/20/2008	10:49:32	6.67	7.62	3.82	4.81	23.33	29.35
11/20/2008	10:50:31	6.82	7.58	3.22	4.09	23.12	29.40
11/20/2008	10:51:32	7.14	7.36	1.58	2.06	22.11	28.77
11/20/2008	10:52:32	4.99	8.46	0.00	0.00	27.73	31.19
11/20/2008	10:53:33	4.88	8.52	0.00	0.00	30.23	33.78
11/20/2008	10:54:31	4.89	8.51	0.00	0.00	30.29	33.86
11/20/2008	10:55:32	4.93	8.51	0.00	0.00	30.25	33.90
11/20/2008	10:56:32	7.95	7.03	0.27	0.37	22.49	31.09
11/20/2008	10:57:33	6.69	7.68	2.57	3.24	23.47	29.57
11/20/2008	10:58:31	6.72	7.67	2.25	2.84	24.52	30.95
11/20/2008	10:59:32	6.68	7.70	1.73	2.18	25.03	31.51
11/20/2008	11:00:33	6.82	7.60	1.70	2.16	24.31	30.91
11/20/2008	11:01:33	7.41	7.25	1.73	2.30	22.61	30.00
11/20/2008	11:02:32	4.98	8.48	0.00	0.00	28.63	32.19
11/20/2008	11:03:32	5.07	8.45	0.00	0.00	31.13	35.19
11/20/2008	11:04:33	5.07	8.45	0.00	0.00	31.37	35.48
11/20/2008	11:05:31	4.98	8.50	0.00	0.00	31.64	35.57
11/20/2008	11:06:32	7.58	7.21	0.25	0.34	24.76	33.27
11/20/2008	11:07:32	6.56	7.72	1.50	1.87	24.21	30.21
11/20/2008	11:08:33	6.71	7.66	1.43	1.80	25.28	31.88
11/20/2008	11:09:31	6.82	7.61	1.04	1.32	25.24	32.09
11/20/2008	11:10:32	6.89	7.57	0.69	0.88	25.10	32.08
11/20/2008	11:11:32	7.61	7.16	0.50	0.67	22.97	30.93
11/20/2008	11:12:33	5.02	8.43	0.00	0.00	28.70	32.35
11/20/2008	11:13:31	4.98	8.44	0.00	0.00	31.98	35.96
11/20/2008	11:14:32	5.08	8.42	0.00	0.00	32.55	36.82
11/20/2008	11:15:32	5.05	8.42	0.00	0.00	32.31	36.50
11/20/2008	11:16:33	7.42	7.29	0.00	0.00	26.38	35.03
11/20/2008	11:17:31	6.78	7.56	0.57	0.72	25.58	32.44
11/20/2008	11:18:32	6.64	7.67	0.67	0.84	26.24	32.94
11/20/2008	11:19:31	6.94	7.56	0.40	0.51	27.42	35.16
11/20/2008	11:20:32	6.82	7.59	0.22	0.28	27.16	34.54
11/20/2008	11:21:33	7.82	7.10	0.14	0.19	23.78	32.55
11/20/2008	11:22:32	4.95	8.49	0.00	0.00	28.98	32.52
11/20/2008	11:23:33	5.22	8.40	0.00	0.00	33.08	37.76
11/20/2008	11:24:31	5.10	8.44	0.00	0.00	34.20	38.75
11/20/2008	11:25:32	5.01	8.49	0.00	0.00	33.77	38.04
11/20/2008	11:26:31	6.94	7.55	0.00	0.00	29.07	37.27
11/20/2008	11:27:32	6.93	7.55	0.76	0.97	26.84	34.38
11/20/2008	11:28:33	6.55	7.80	0.69	0.86	27.51	34.32
11/20/2008	11:29:32	6.79	7.68	0.47	0.60	28.36	35.96
11/20/2008	11:30:33	6.78	7.68	0.10	0.13	27.51	34.86
11/20/2008	11:31:31	8.07	7.03	0.09	0.13	24.38	34.02
11/20/2008	11:32:32	5.38	8.28	0.00	0.00	29.42	33.93
11/20/2008	11:33:33	5.14	8.45	0.00	0.00	33.57	38.12
11/20/2008	11:34:31	5.19	8.37	0.00	0.00	35.59	40.54
11/20/2008	11:35:32	5.11	8.44	0.00	0.00	35.13	39.81
11/20/2008	11:36:33	6.53	7.69	0.00	0.00	31.24	38.91
11/20/2008	11:37:32	7.26	7.32	0.00	0.00	27.61	36.24
11/20/2008	11:38:32	6.63	7.64	0.00	0.00	28.68	35.99
11/20/2008	11:39:33	6.73	7.56	0.00	0.00	28.89	36.49
11/20/2008	11:40:31	6.82	7.57	0.00	0.00	28.69	36.46
11/20/2008	11:41:32	7.67	7.09	0.00	0.00	25.82	34.92
11/20/2008	11:42:33	5.99	7.84	0.00	0.00	29.43	35.34
11/20/2008	11:43:32	5.15	8.36	0.00	0.00	35.18	39.98
11/20/2008	11:44:32	5.20	8.37	0.00	0.00	36.12	41.19
11/20/2008	11:45:31	5.13	8.38	0.00	0.00	36.50	41.42
11/20/2008	11:46:32	5.73	8.06	0.00	0.00	34.25	40.42
11/20/2008	11:47:33	7.73	7.03	0.06	0.08	27.65	37.58
11/20/2008	11:48:31	6.67	7.60	0.10	0.13	28.87	36.30
11/20/2008	11:49:32	6.79	7.57	0.00	0.00	29.42	37.31
11/20/2008	11:50:31	6.82	7.52	0.00	0.00	29.27	37.21
11/20/2008	11:52:35	3.28	10.39	3.09	3.14	46.01	46.74
Average:		6.89	7.48	6.72	9.37	24.43	30.96

Any negative values are assigned a value of zero (0.00).

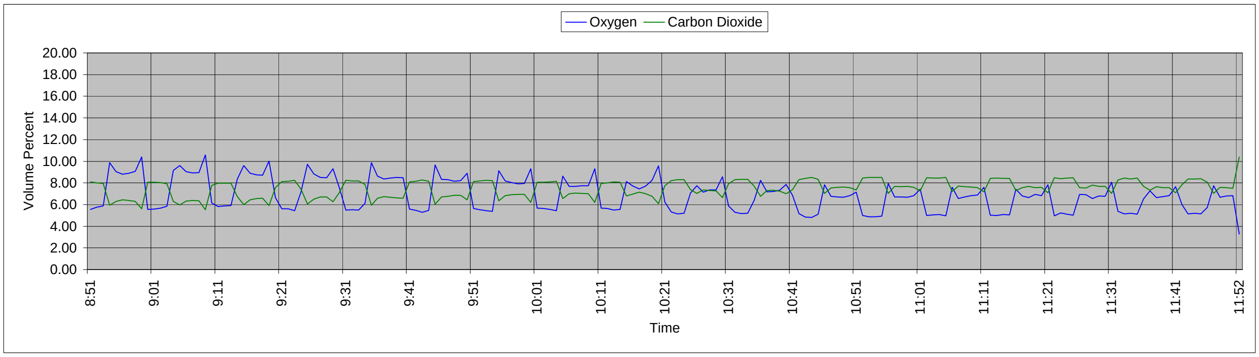
	O_2 E %	CO_2 E %	CO E ppm	CO E ppm @ 3% O_2	NOx E ppm	NOx E ppm @ 3% O_2
Initial Zero	0.075	0.295	-0.47		0.01	
Initial Span	12.491	12.261	52.80		51.83	
Post Zero	-0.535	0.149	-0.42		0.15	
Post Span	12.462	12.352	53.58		54.12	
Avg. Zero	-0.23	0.22	-0.45		0.08	
Avg. Span	12.48	12.31	53.19		52.98	
Span Gas	12.100	12.100	53.60		53.20	
Bias Corrected Average:	**6.8**	**7.3**	**7.2**	**9.1**	**24.5**	**31.1**

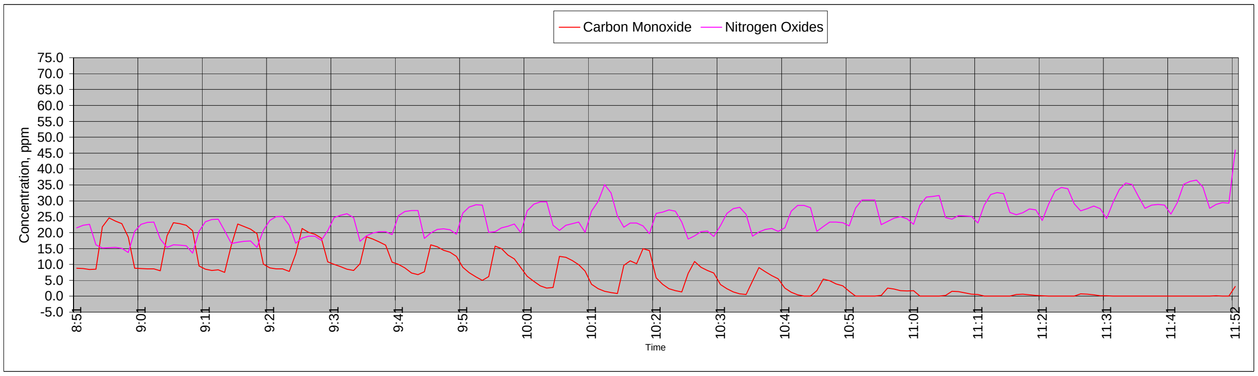
Jorgensen Forge Corporation 104(e) Response

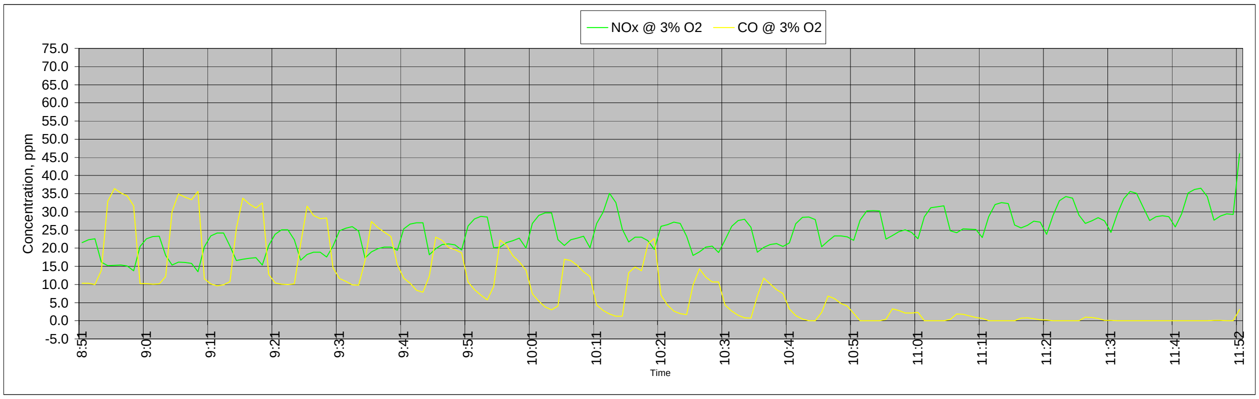
AMTEST AIR QUALITY, A DIVISION OF HOEFLER CONSULTING GROUP

Jorgensen Forge Corporation

Preheater Stack







JORGENSEN FORGE
SERVICE EPORT
08-27-08

Tom Keron
Bloom service Tech
ph 440-610-1321

By BLOOM ENGINEERING

Bloom Engineering was asked to go over the #11 furnace to check for proper operation and monitor the Gas emissions and adjust accordingly. The findings are as follows;

Furnace Temperature Demand control loop

The control loop has a clamp of maximum 70% output set up through the PLC control. Jorgensen says that's ok because it is not hindering the operation of the furnace. The temperature has no problem making set point.
The flow readings at this output while furnace is in normal regen mode are approximately;

Gas	12198scfh
1st stage air	49200scfh
2nd stage air	93500scfh

Jorgensen had an outside Gas analysis firm come in to pre-test the gas emissions and make adjustments as necessary. There are three points of testing that were done, two flue stacks and the exhaust flow from the regen burners that are being called the pre-heat duct. exhaust.

All three points of testing showed that the emissions are within tolerances while the furnace was running **soaked out** at approximately **12 to 20 percent heat demand.**

However, while testing there was quite a bit of swinging in the oxygen levels. This was being caused by the continual adjustment of the furnace pressure control loop. Changes were made in this loop and will be explained below.

There were three issues found while checking the operation of the furnace. One of these issues was corrected (Furnace pressure control). The other two will still need attention soon.

Explanations are on next page.

Issue 1
FURNACE PRESSURE CONTROL

When I arrived I watched the pressure control swing dramatically when the burners switched from firing to exhausting. When A burner was firing the pressure was positive and when B burner was firing the pressure would go negative.
Bloom had tried to compensate for this at a prior visit by applying a biasing of the 2 pressure controls. It didn't seem to be working well. While taking the emissions readings from the flue stacks this swinging of the pressure controls was making a big swing in the oxygen reading at each stack (from 3% to 10%approx.).

I talked to Jorgensen about moving the point of measurement to a more equal position in the furnace instead of where it was originally located. We moved the impulse line to the center of the back wall between the burners. This leveled out the signal from the transmitter immensely. It was decided that the change would be left as is for now.

While checking the emissions after we stopped the swinging of the pressure control dampers, the oxygen swinging leveled out.

In order to stop the swing of the dampers we had to make a program change in the original biasing of these controls.
At present there is no biasing of the controls and it is just a straight PID control.
The furnace pressure is now holding steady.

Issue 2
Lumiflame

The program turns on the lumiflame control after the control temperature thermocouple and the over-temp temperature are above 1800 degrees
Something in the program is kicking the system out of lumiflame even though the temperature criteria had been met. We believe that there is in the lumiflame logic there is a low gas flow number that will make the system go back to regular regen mode. I don't know why this is there. This needs to be addressed. The Problem still exists

Issue3
Bottling

The system does not bottle when the **heat demand goes below 20% output.**
The way this system is set up right now is that if the temperature of the control thermocouple goes over set point by 30 degrees, the system bottles. After the last two visits from Bloom, the system doesn't go over set point but by a few degrees. This system will not bottle ever anymore.
The heat demand can go to 0% output and the system will continue to fire in regen mode.

pscleanair.org
Puget Sound Clean Air Agency

PUGET SOUND CLEAN AIR AGENCY

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Seattle WA 98101-3317
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facilitysubmittal@pscleanair.org

COMPLIANCE TEST NOTIFICATION

This Notification of intended action does not constitute approval by the Agency nor does it satisfy a requirement for a test plan, if one exists.

Agency Use Only: Reg No: ***Date Received:*** ***Date Logged:***

Facility Name: JORGENSEN FORGE

Facility Address (include city/state/zip): 8531 E. MARGINAL WAY SOUTH SEATTLE, WA 98108

Facility Contact Information for Test
Name: WAYNE DESBERG
Phone: 206-300-7255
Fax: 206-357-1075
E-Mail: WDESBERG @ JORGENSENFORGE.COM

Test Contractor: AMTEST

Test Contractor Mailing Address: 30545 S.E. 84th ST. #5 P.O. BOX 525 PRESTON, WA 98050

Test Contractor Contact Information
Name: STEVE FRYBERGER
Phone: 425-503-2557
Fax:
E-Mail: SFRYBERGER @ HOEFLER.NET.COM

Testing Dates: PROPOSED NOV. 19, 2008

Emission Unit	Pollutant Tested	Test Method(s) (list all to be used)	Purpose for the Test (see Note below)
F-11 FORGE FURNACE	NOx & CO	EPA METH 3A	PERMIT COMPLIANCE
		EPA METH 7E	
		EPA METH 19	

Any Test Method Deviations?
☒ Yes *(attach explanation)* ☐ No

Written Test Plan Required?
☒ Yes ☐ No ☐ Unknown

Attachments to this Notification? ☒ Yes *(list below)* ☐ No
1-DEVIATION LETTER
2-AMTEST TEST PLAN

Person Submitting Notification: WAYNE DESBERG

Affiliation: JORGENSEN FORGE

NOTE: For example, NSPS/NESHAP Subpart, citation, NOC Order of Approval #, PSD, Puget Sound Clean Air Agency Regulations (I, II, or III), RATA, or Other. Please include the specific requirement if you have it.

Form 50-127 (10/01/08 *NS*)

Wayne Desberg
Jorgensen Forge
Nov. 7, 2008

Brian Renninger
Puget Sound Clean Air Agency

Subject: Compliance Test Notification Attachments- Jorgensen Forge F-11 Furnace

Per our conversation today, we are submitting our tentative test plan for our F-11 Forge Reheat Furnace. At this point the only test method deviation we envision is the calculated "hot" stack flow measurement which is to be calculated using Method 19 minus the measured regen stack flow, with the resulting flow divided between the two "hot" stacks.

We anticipate further discussions between ourselves, Amtest and the Agency to insure we have complete agreement prior to any testing.

Thank you for your time,

Wayne Desberg
Jorgensen Forge
8531 East Marginal Way South
Seattle, WA. 98108

November 4, 2008

Mr. Chuck Luce
Jorgensen Forge Corp.
8531 East Marginal Way South
Seattle, WA 98108-1018

Dear Chuck,

Please find herein AmTest Air Quality's (ATAQ) ***cost estimate*** for the source testing of the forge furnaces at the Jorgensen Forge Facility in Seattle, WA. To ensure that all emissions from this process are reconciled during the testing, simultaneous testing will be required from each rectangular furnace stack and from the preheater exhaust.

Testing and analysis procedures to be used for this project are presented in the Environmental Protection Agency (EPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A and on the EPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/). Three (3) one-hour test runs of each applicable type will be conducted at each source.

EPA Method 3A - Molecular Weight and Oxygen Measurements (Stack)

EPA Method 3A will be performed to determine the molecular weight of the gas based on dry percent level measurements of the concentration of O_2 and CO_2 in the stack gas. The oxygen data will also be used to correct the concentration value of other parameters for reporting purposes. O_2 will be measured using a paramagnetic analyzer. CO_2 will be measured using a non-dispersive infrared (NDIR) analyzer. Method 3A samples will be collected at a point of average velocity. Prior to testing, a calibration error check will be performed using zero, mid, and high-range EPA Protocol No. 1 calibration gases. A sampling system bias check will also be performed prior to beginning the testing. The gas measurements will be recorded once per minute during each emission test period using a data acquisition system, and averaged. A zero and calibration drift check will be performed after each run using EPA Protocol No. 1 certified gas. Each sample run average will be bias-corrected using the drift check data. *Molecular weight data will be collected during all test periods. Three 60-minute simultaneous stack Method 3A tests will be conducted on the unit.*

EPA Method 7E - Nitrogen Oxides (Stack)

EPA Method 7E will be performed to quantify dry parts per million (ppm) emission concentrations of nitrogen oxides (NO_x) in the stack gas using a chemiluminescent analyzer. Method 7E samples will be collected at a point of average velocity. Prior to testing, a calibration error check will be performed using zero, mid, and high-range EPA Protocol No. 1 calibration gases. A sampling system bias check will also be performed prior to beginning the testing. The gas measurements will be recorded once per minute during each emission test period using a data acquisition system, and averaged. A zero and calibration drift check will be performed using EPA Protocol No. 1 certified gas after each run. Each sample run average will be bias-corrected using the drift check data. A Method 7E analyzer NO_2 to NO converter efficiency test will also be completed along with this test series. *Three 60-minute simultaneous stack Method 7E tests will be conducted on the unit.*

EPA Method 10 - Carbon Monoxide (Stack)

EPA Method 10 will be performed to quantify dry parts per million (ppm) emission concentrations of carbon monoxide (CO) using a gas filter correlation non-dispersive infrared (NDIR) analyzer. Method 10 samples will be collected at a point of average velocity. Am Test-Air Quality conducts EPA Method 10 testing with the same rigorous bias and drift requirements as found in EPA Method 6C. Prior to testing, a calibration error check will be performed using zero, mid, and high-range EPA Protocol No. 1 calibration gases. A sampling system bias check will also be performed prior to beginning the testing. The gas measurements will be recorded once per minute during each emission test period using a data acquisition system, and averaged. A zero and calibration drift check will be performed after each run using EPA Protocol No. 1 certified gas. Each sample run average will be bias-corrected using the drift check data. *Three 60-minute Method 10 stack tests will be conducted simultaneously on each exhaust.*

Theoretical Exhaust Gas Flow Determination

EPA Method 19 will be used to calculate theoretical stack gas flow rates for this test program. To perform these calculations, Jorgensen Forge will need to provide ATAQ natural gas usage rates during each run (in scf/hr), the heat content of the fuel (in Btu/scf), and a fuel factor (in scf/MMBtu). If Jorgensen Forge provides an ultimate analysis of the fuel, ATAQ can calculate the fuel factor using the mole fractions of each component of the fuel. If no ultimate analysis of the fuel is provided, ATAQ will use the standard F-factors listed in EPA Method 19 for the fuel which is similar to the fuel being fired.

It will be the responsibility of Jorgensen Forge personnel to provide ATAQ with the necessary process information during each test period for inclusion in our final report. This data will include such information as production data and natural gas usage during the test periods.

It is the responsibility of Jorgensen Forge to provide OSHA approved access to each sample site, and to provide adequate test ports. ATAQ requires at least six 110 volt, 15-20 amp circuits accessible for our exclusive use during the testing.

ATAQ will submit four (4) copies of the final report to Jorgensen Forge, *within thirty (30) days* after the testing trip is completed. The reports will be formal, bound documents containing information about each source, dates and times of each test, details of sampling and analysis procedures, quality assurance procedures, and a discussion of how the results were calculated, along with example calculations. Results will be presented in concentration units (e.g. parts per million (ppm)), emission rate units (e.g. pounds of pollutant per 1000 therms). *Any additional reporting units that are required should be requested prior to the start of the project.* It is the responsibility of Jorgensen Forge to forward a copy of any applicable final reports to the PSCAA.

COST ESTIMATE

Compliance Testing:

Compliance testing will entail two instrument vans with 3-sets of instruments for simultaneous testing, two senior project personnel, and one field technician. The estimated costs to perform these tests, including preparation, mobilization, field-testing, data reduction and report preparation are **$9,450.00.**

This is a time and materials cost estimate. Process difficulties which delay testing or requests for additional work will be billed at our prevailing rates. Project progress billings will be sent out on a monthly basis.

AmTest Air Quality appreciates the opportunity to provide this quotation. Please contact me at (425)222-7746 or sfryberger@hoeflernet.com if I may provide additional information or clarification.

Sincerely,
AmTest Air Quality
a Division of Hoefler Consulting Group

Steve Fryberger

Steve Fryberger
Source Testing Manager
[bids/2008/Jorgensen Forgebd]

TABLE 1
BLOOM ENGINEERING COMPANY, INC.
Company Confidential Information

Bloom Ref. #:	BLOOM REF# 1006 600
Customer:	Nutec Jorgensen
Furnace:	Forge Furnace
Date	20-Jun-07
BloomNOx Version	4.2
Page 1 of 1	

NOx Information
Fuel: NAT GAS

ZONE NAME	No. Bnrs	Burner Style/Size	Lance	Port L/D	Comb Air (F)	Inlet O2 %	Excess Air %	Nominal Capacity Burner MMBtu/Hr	Nominal Capacity Zone MMBtu/Hr	Actual Capacity Burner MMBtu/Hr	Actual Capacity Zone MMBtu/Hr	Zone Temp (F
Zone #1	1	1150-XXX	N/A	1.0	----	20.8	10.0	15.0	15.0	17.9	17.9	2300.

Regenerative Input EGR:None Cycle time:40.0

Guaranteed NOx (LBS/MM BTU) (HHV) = 0.090

NOTE: All Values are based on the attached fuel analysis. The NOx levels shown are based on lab testing conducted by Bloom and field tests conducted by approved testing agencies, under closely controlled conditions.

It must be recognized that the many variables inherent in furnace operations can positively or negatively alter the expected NOx values.

No tramp air infiltration allowance, unless otherwise noted.

The values listed are based on the above operation parameters. NO2 from fuel bound N2 is not included.

For fuel analysis - see attached sheet

TABLE 2
BLOOM ENGINEERING COMPANY, INC. NOX PREDICTOR

FUEL ANALYSIS (% by volume)

Bloom Ref. #:	BLOOM REF# 1006 600
Customer:	Nutec Jorgensen
Furnace:	Forge Furnace
Number of Zones:	1
Date of Run:	20-Jun-07
Date of Print:	20-Jun-07
BloomNOx Version	4.2

NAT GAS

N2	2.92
CO2	0.650
CH4	89.4
C2H6	5.14
C3H8	1.41
C4H10	0.360
C5H10	0.140

Jorgensen Forge Corporation Application for Modification of Order No. 5994 Synthetic Minor

Project Description

Jorgensen Forge Corporation of Seattle proposes to modify Puget Sound Clean Air Agency's Order No. 5994 to change the basis for calculating its emissions of carbon monoxide to the current emission factors listed in EPA's *Compilation of Air Pollutant Emission Factors* (AP-42).

Jorgensen Forge is a privately held company that manufactures precision machined forging from material grades which include carbon and low alloy steel, 300, 400, PH, and duplex stainless grades, aluminum alloys, titanium alloys, and nickel base alloys. The primary sources of air emissions are the melt shop that include two electric arc furnaces, an Argon-Oxygen Decarburization Vessel (AOD), reheat and heat treating furnaces, and a boiler.

Emission Estimate

On July 19, 1995, the Puget Sound Clear Air Agency (PSCAA) issued an order (Order No. 5994) to establish emission limits for Jorgensen Forge Corporation in Seattle. That order limited Jorgensen Forge to a plant wide limit of 99 tons of carbon monoxide during any 12 consecutive month period and limited the annual melt production of forges to 10,000 tons and the annual natural gas consumption to 5.6 million therms. The order specified that the emissions will be based on EPA's AP-42 published emission factors or stack tests.

The limits of 10,000 tons of forgings and 5.6 million therms per year were based on then current EPA emission factors found in AP-42. In the ten years since PSCAA issued that order, EPA has reviewed and updated the emission factors found in AP-42. For example, the production limit of 10,000 tons per year was based on an emission factor of 18 pounds of carbon monoxide per ton of steel. That factor was based on a 1970 Department of Health document dealing with CO emissions from large point sources[1]. On December 14, 2004, EPA proposed a new emission factor of 2.0 pound per ton for mini-mills similar to Jorgensen Forge's. That new emission factor was based on actual recent stack tests at facilities similar to Jorgensen Forge in Seattle.

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1 *Control Techniques For Carbon Monoxide Emissions from Stationary Sources*, AP-65, Department Of Health, Education And Welfare, Washington, DC, March 1970.

Similarly, the limit of 5.6 million therms per year was based in part on an emission factor of 34.7 pounds of CO per million cubic feet of natural gas. The current CO emission factor for burning natural gas is 84 pounds per million cubic feet of natural gas.

Table 1 shows the emission factors for CO that Jorgensen currently uses and the current factor that EPA has published in AP-42. The table also shows the emission factors that Jorgensen Forge intends to use to calculate NOx emissions. The NOx emissions have been included in the annual emission inventory but have not been include in the calculations for Order No. 5994. The difference in NOx emission factors for natural gas combustion is a result of refinement of the EPA's emission factors.

Table 1 – Emission Factors

	Present	Proposed AP-42
Electric Arc Furnace	0.009 ton CO/ton steel 18 lb CO/ton steel 0.2 lb NOx/ton steel	0.001 ton CO/ton steel 2.0 lb CO/ton steel 0.39 lb NOx/ton steel
Natural Gas Combustion	0.0017 ton CO/1000 Therms 34.7 lb CO/MMcf gas 9.62 lb NOx/1000 therms	0.0041 ton CO/1000 therms 84 lb CO/MMcf. 9.80 lb NOx/1000 therms 100 lb/MMcf

Table 2 compares the estimated emissions at the currently permitted maximum production rates using Jorgensen's current emission factors and EPA's current and proposed factors.

Table 2 – Emissions Comparison

	Electric furnace			Natural gas			Total	
	Forge tons	CO tons	NOx Tons	1000'S therms	CO tons	NOx tons	CO tons	NOx Tons
Present Factors	10,000	90.0		5,600	9.52		99.52	
Proposed EPA Factors	10,000	10.0		5,600	23.06		33.06	
Potential Emissions	42,000	42	8.19	12,000	49.41	58.82	91.41	67.01
Actual Emissions	6,227	6.23	1.21	4,552	18.74	22.31	24.97	23.53

Table 2 shows that the actual emission of both CO and NOx are about 25 percent of the 100 tons per year threshold for Title V sources. The actual emissions are based on the electric arc furnace operating only during times when electricity rates are low; hence the potential production could be three or four times the current actual production. Jorgensen Forge currently operates the electric arc furnaces one shift a day and five days per week. To estimate the potential emissions from the electric arc furnace the capacity of 10,000 tons running one shift per day was multiplied by 4.2 to reflect the 21 shifts operation. The result of 42,000 tons per year represents the electric arc furnace operating at capacity 8760 hours per year. The annual capacity of the facility to burn natural gas to accommodate the 42,000 tons per year of production would be 12,000,000 therms. The results show that the potential emissions of both CO and NOx are below the 100 tons per year threshold for a Title V source and therefore a synthetic minor limit is not necessary.

Jorgensen Forge understands that the EPA emission factors are estimates based on tests at similar facilities and do not necessarily represent the emission of the Seattle facility and therefore proposes to verify the emission factor if the calculated emissions exceed 75 tons per year. Specifically Jorgensen Forge proposes the following approval conditions.

Recommended Approval Conditions

1. Jorgensen Forge shall limit facility-wide emissions of carbon monoxide (CO) and nitrogen oxides (NOx) to less than 99 tons each during any 12 consecutive months after the date of this Order.
2. Jorgensen Forge shall determine monthly natural gas consumption through monthly accounting invoices from the gas supplier.
3. Jorgensen Forge shall determine monthly electric arc furnace production.
4. Jorgensen Forge shall calculate total CO emissions from the base for the previous 12 months, using the following procedure:

   (a) Multiply millions of cubic feet of natural gas consumed for the previous month by the CO emission factor of 0.0041 ton of CO per 1000 Therms (84 lb/MMcf) emitted due to combustion of natural gas.

   (b) Multiply the tons electric arc furnace production thousands for the previous month by the CO emission factor of 0.001 tons of CO per of ton steel (2.0 lb CO/ton).

   (c) Add the results of the calculations above to get total CO emissions for the previous month.

   (d) Add total CO emissions to preceding 11 months CO emissions to get tons CO emitted for the previous 12 months.

5. Jorgensen Forge shall calculate total NOx emissions from the base for the previous 12 months, using the following procedure:

   (a) Multiply millions of cubic feet of natural gas consumed for the previous month by the NOx emission factor of 0.0049 ton of NOx per 1000 Therms (100 lb/MMcf) emitted due to combustion of natural gas.

(b) Multiply the tons electric arc furnace production thousands for the previous month by the NOx emission factor of 0.000195 tons of NOx per of ton steel (0.39 lb NOx/ton).

(c) Add the results of the calculations above to get total NOx emissions for the previous month.

(d) Add total NOx emissions to preceding 11 months NOx emissions to get tons NOx emitted for the previous 12 months.

6. Jorgensen Forge shall maintain CO and NOx emissions calculations and consumption records for natural gas and steel produced on site and available for inspection by the Puget Sound Clean Air Agency for at least 5 years. Recordkeeping shall begin no later than 30 days from the date if this Order. The most recent two years worth of records shall be available for inspection after 25 months from the date of this Order.

7. Within 180 days after the calculated emissions of either CO or NOx exceed 75 tons for any 12-month period, Jorgensen Forge shall conduct an emission test for the pollutant whose calculated emissions exceeded 75 tons per year. The test shall be conducted according to PSCAA Regulation 1, Section 3.07 Compliance Tests.

8. Jorgensen Forge shall notify the Puget Sound Clean Air Agency (Attn: Permit Certification), in writing, within 30 days after the end of each 12-month period if, during that period, emissions of CO or NOx exceeded 90 tons. The report shall include emissions data for the time period for which these thresholds were exceeded.

9. This Order shall expire upon Puget Sound Clean Air Agency's determination that Jorgensen Forge has submitted a complete application for an operating permit under Article 7 of Puget Sound Clean Air Agency Regulation I.

July 24, 2008

Wayne Desberg, Engineering Manager
Jorgensen Forge Corp.
8531 East Marginal Way South
Seattle, WA 98108-1018

Dear Wayne,

Please find herein AmTest Air Quality's (ATAQ) ***Proposed Test Plan*** for source testing at the Jorgensen Forge Facility in Seattle, WA. To ensure overall forge furnace emissions are quantified, simultaneous source testing is required from each of two rectangular furnace stacks and from the preheater exhaust.

Testing and analysis procedures to be used for this project are presented in the Environmental Protection Agency (EPA) document Title 40, Code of Federal Regulations, Part 60 (40 CFR 60), Appendix A and on the EPA Technology Transfer Network Emission Measurement Center (EPA-TTN-EMC) website, Test Methods Section (http://www.epa.gov/ttn/emc/). Three (3) one-hour test runs of each applicable type will be conducted at each source.

EPA Method 3A - Molecular Weight and Oxygen Measurements

EPA Method 3A will be performed to determine the molecular weight of the gas based on dry percent level measurements of the concentration of O_2 and CO_2 in the stack gas. The oxygen data will also be used to correct the concentration value of other parameters for reporting purposes. O_2 will be measured using a paramagnetic analyzer. CO_2 will be measured using a non-dispersive infrared (NDIR) analyzer. Method 3A samples will be collected at a point of average velocity. Prior to testing, a calibration error check will be performed using zero, mid, and high-range EPA Protocol No. 1 calibration gases. A sampling system bias check will also be performed prior to beginning the testing. The gas measurements will be recorded once per minute during each emission test period using a data acquisition system, and averaged. A zero and calibration drift check will be performed after each run using EPA Protocol No. 1 certified gas. Each sample run average will be bias-corrected using the drift check data. *Molecular weight data will be collected during all test periods. Three 60-minute simultaneous stack Method 3A tests will be conducted on the unit.*

EPA Method 7E - Nitrogen Oxides

EPA Method 7E will be performed to quantify dry parts per million (ppm) emission concentrations of nitrogen oxides (NO_x) in the stack gas using a chemiluminescent analyzer. Method 7E samples will be collected at a point of average velocity. Prior to testing, a calibration error check will be performed using zero, mid, and high-range EPA Protocol No. 1 calibration gases. A sampling system bias check will also be performed prior to beginning the testing. The gas measurements will be recorded once per minute during each emission test period using a data acquisition system, and averaged. A zero and calibration drift check will be performed using EPA Protocol No. 1 certified gas after each run. Each sample run average will be bias-corrected using the drift check data. A Method 7E analyzer NO_2 to NO converter efficiency test will also be completed along with this test series. *Three 60-minute simultaneous stack Method 7E tests will be conducted on the unit.*

EPA Method 10 - Carbon Monoxide

EPA Method 10 will be performed to quantify dry parts per million (ppm) emission concentrations of carbon monoxide (CO) using a gas filter correlation non-dispersive infrared (NDIR) analyzer. Method 10 samples will be collected at a point of average velocity. Am Test-Air Quality conducts EPA Method 10 testing with the same rigorous bias and drift requirements as found in EPA Method 6C. Prior to testing, a calibration error check will be performed using zero, mid, and high-range EPA Protocol No. 1 calibration gases. A sampling system bias check will also be performed prior to beginning the testing. The gas measurements will be recorded once per minute during each emission test period using a data acquisition system, and averaged. A zero and calibration drift check will be performed after each run using EPA Protocol No. 1 certified gas. Each sample run average will be bias-corrected using the drift check data. *Three 60-minute Method 10 stack tests will be conducted simultaneously on each exhaust.*

Theoretical Exhaust Gas Flow Determination

EPA Method 19 will be used to calculate theoretical stack gas flow rates for this test program. To perform these calculations, Jorgensen Forge will need to provide ATAQ natural gas usage rates during each run (in scf/hr), the heat content of the fuel (in Btu/scf), and a fuel factor (in scf/MMBtu). If Jorgensen Forge provides an ultimate analysis of the fuel, ATAQ can calculate the fuel factor using the mole fractions of each component of the fuel. If no ultimate analysis of the fuel is provided, ATAQ will use the standard F-factors listed in EPA Method 19 for the fuel which is similar to the fuel being fired.

It will be the responsibility of Jorgensen Forge personnel to provide ATAQ with the necessary process information during each test period for inclusion in our final report. This data will include such information as production data and natural gas usage during the test periods.

It is the responsibility of Jorgensen Forge to provide OSHA approved access to each sample site, and to provide adequate test ports. ATAQ requires at least six 110 volt, 15-20 amp circuits accessible for our exclusive use during the testing.

ATAQ will submit four (4) copies of the final report to Jorgensen Forge, *within thirty (30) days* after the testing trip is completed. The reports will be formal, bound documents containing information about each source, dates and times of each test, details of sampling and analysis procedures, quality assurance procedures, and a discussion of how the results were calculated, along with example calculations. Results will be presented in concentration units (e.g. parts per million (ppm)), emission rate units (e.g. pounds of pollutant per 1000 therms). *Any additional reporting units that are required should be requested prior to the start of the project.* It is the responsibility of Jorgensen Forge to forward a copy of any applicable final reports to the PSCAA.

AmTest Air Quality appreciates the opportunity to provide this quotation. Please contact me at (425)222-7746 at the office or my cell at (971)235-3982 or dradonski@hoeflernet.com if I may provide additional information or clarification.

Sincerely,
AmTest Air Quality
a Division of Hoefler Consulting Group

Dan Radonski

Daniel A. Radonski
Testing Services Coordinator

		Run 1	Run 2	Run 3
Firing rate	MMBtu/hr	1.98	2.23	2.07
Fc	scf CO2/MMBtu	1040	1040	1040
CO2 flow rate	scf/min	34.3	38.7	35.9
Preheater				
Flow	scf/min	504	502	491
O2	%	16	15.8	15.7
CO2	%	2.8	3.1	3
CO2	scf/min	14.11	15.56	14.73
Fraction of total CO2		41%	40%	41%
NOx	ppm	20.40	23.60	23.80
	lb/MMBtu	0.092	0.102	0.101
		0.18		
exhaust Stack				
Total CO2	scf/min	20.21	23.09	21.15
% of total CO2		59%	60%	59%
West Stack				
CO2		4.651	3.208	2.789
O2		12.873	15.624	16.859
NOx	ppm	29.01	27.81	19.46
	ppm @ 3% O2	64.7	94.4	86.2
NOx	lb/MMBtu	0.080	0.117	0.107
East Stack				
CO2		8.71	8.532	8.539
O2		5.176	5.565	5.572
NOx	ppm	61.85	68.64	68.49
	ppm @ 3% O2	70.4	80.1	80.0
CO2 @ 0% O2		11.58	11.63	11.64
NOx	lb/MMBtu	0.087	0.099	0.099

PUGET SOUND CLEAN AIR AGENCY

ENGINEERING DIVISION

110 UNION STREET, ROOM 500, Seattle, Washington 98101-2038
(206) 689-4052 Fax: (206) 343-7522 <www.pscleanair.org>

Notice of Construction and Application for Approval

Incomplete applications may delay Agency review

FORM P
SIDE 1

Be sure to complete items 39, 40, 41, & 43 before submitting Form P.

(AGENCY USE ONLY)
DATE ________________ N/C NUMBER ____________
REG. NO. ______________ SIC/NAICS ________________

1. TYPE OF BUILDING (Check) ☐ New ☒ Existing	2. STATUS OF EQUIPMENT (Check) ☒ New ☐ Existing ☐ Altered ☐ Relocation	7. APPLICANT NAME & MAILING ADDRESS 8531 E. Marginal Way S Seattle WA, 98106
3. COMPANY (OR OWNER) NAME **Jorgensen Forge Corporation**		8. APPLICANT EMAIL ADDRESS cluce@JorgensenForge.com
4. COMPANY (OR OWNER) MAILING ADRESS 8531 E. Marginal Way S Seattle WA, 98106		9. INSTALLATION ADDRESS (Include City & Zip Code) 8531 E. Marginal Way S Seattle WA, 98106
5. PHONE NUMBER: 206-357 1078 FAX NUMBER:206-357-1075	6. NATURE OF BUSINESS Metal Forging Supplier	10. TYPE OF PROCESS Metal Forging

EQUIPMENT (ENTER ONLY NEW EQUIPMENT OR CHANGES. ENTER NUMBER OF UNITS OF EQUIPMENT IN COLUMN 'NO OF UNITS.' COMPLETE FORM 'S' FOR EACH ENTRY)

11. NO. OF UNITS	SPACE HEATERS OR BOILERS	14. NO. OF UNITS	OVENS	15. NO. OF UNITS	MECHANICAL EQUIP.	16. NO. OF UNITS	MELTING FURNACES
(a)		(a) ___	CORE BAKING OVEN	(a) ___	AREAS	(a) ___	POT
12. NO. OF UNITS	**INCINERATORS**	(b) ___	PAINT BAKING	(b) ___	BULK CONVEYOR	(b) ___	REVERBERATORY
		(c) ___	PLASTIC CURING	(c) ___	CLASSIFIER	(c) ___	ELECTRIC
(a)		(d) ___	LITHO COATING OVEN	(d) ___	STORAGE BIN	(d) ___	INDUC/RESIST
13. NO. OF UNITS	**OTHER SYSTEMS**	(e) ___	DRYER	(e) ___	BAGGING	(e) ___	CRUCIBLE
		(f) ___	ROASTER	(f) ___	OUTSIDE BULK STORAGE	(f) ___	CUPOLA
		(g) ___	KILN	(g)	LOADING OR UNLOADING	(g) ___	ELECTRIC ARC
(a) ___	DEGREASING, SOLVENT	(h) ___	HEAT-TREATING	(h) ___	BATCHING	(h) ___	SWEAT
(b) ___	ABRASIVE BLASTING	(i) ___	OTHER	(i) ___	MIXER (SOLIDS)	(i) 1	OTHER **REHEAT**
(c) ___	OTHER- SYSTEM	(j) ___		(j) ___	OTHER	(j) ___	GLASS
							OTHER NON METALLIC

17. NO. OF UNITS	GENERAL OPER. EQUIP.	17. NO. OF UNITS	GENERAL OPER. EQUIP.	17. NO. OF UNITS	GENERAL OPER. EQUIP.	18. NO. OF UNITS	OTHER EQUIPMENT
(a) ___	CHEMICAL MILLING	(f) ___	GALVANIZING	(k) ___	ASPHALT BLOWING	(a) ___	SPRAY PAINTING GUN
(b) ___	PLATING ______	(g) ___	IMPREGNATING	(l) ___	CHEMICAL COATING	(b) ___	SPRAY BOOTH OR ROOM
(c) ___	DIGESTER	(h) ___	MIXING OR FORMULATING	(m) ___	COFFEE ROASTER	(c) ___	FLOW COATING
(d) ___	DRY CLEANING	(i) ___	REACTOR	(n) ___	SAWS & PLANERS	(d) ___	FIBERGLASSING
(e) ___	FORMING OR MOLDING	(j) ___	STILL	(o) ___	STORAGE TANK	(e) ___	OTHER

CONTROL DEVICES (ENTER NUMBER OF UNITS OF EQUIPMENT IN SPACES IN COLUMNS. COMPLETE A FORM R FOR EACH ENTRY)

19. NO. OF UNITS	CONTROL DEVICE	20. NO. OF UNITS	CONTROL DEVICE	21. NO. OF UNITS	CONTROL DEVICE	22. NO. OF UNITS	CONTROL DEVICE
(a) ___	SPRAY CURTAIN	(a) ___	AIR WASHER	(a) ___	ABSORBER	(a) ___	DEMISTER
(b) ___	CYCLONE	(b) ___	WET COLLECTOR	(b) ___	ADSORBER	(b) ___	BAGHOUSE
(c) ___	MULTIPLE CYCLONE	(c) ___	VENTURI SCRUBBER	(c) ___	FILTER PADS (FILTERS	(c) ___	ELEC. PRECIPITATOR
(d) ___	INERTIAL COLL.- OTHER	(d) ___	DUST COLLECTOR	(d) ___	AFTERBURNER	(d) ___	OTHER

23. BASIC EQUIPMENT COST (ESTIMATE) EXISTING	24. CONTROL EQUIPMENT COST (ESTIMATE) EXISTING	25. DAILY HOURS FROM 12:00 AM to 12:00 AM	26. DAYS OF OPERATION ☒ S ☒ M ☒ T ☒ W ☒ T ☒ F ☒ S
27. ESTIMATED STARTING DATE OF CONSTRUCTION: August 30, 2007		28. ESTIMATED COMPLETION DATE OF CONSTRUCTION: October 24, 2007	

Your application <u>will</u> <u>not</u> <u>be</u> processed unless you mail a $750 filing fee payment *along with this application* to this Agency at the address noted at the top of this form. Additional fees may apply after your application is reviewed.

Notice of Construction Application

Side 2

FORM P

STACKS OR VENTS (LIST NUMBER, TYPE, AND SIZE OF VENT)

29. RAW MATERIALS (List materials used in process) AND FUELS (Type and amount)	ANNUAL AMT. UNITS	30. PRODUCTS (List End Products)	ANNUAL PROD. UNITS
(a) Steel billets	10,000 tons	(a) Heated steel billets	10,000 tons
(b) Natural gas	372,500 therms	(b)	
(c)		(c)	

31. NO. OF UNITS	DESCRIPTION OF OPENING	32. HEIGHT ABOVE GRADE (FT.)	33. VOLUME EXHAUSTED	DIMENSIONS (INCHES)	
				34. LENGTH (OR DIAM)	35. WIDTH
(a)	STACKS (FROM TOP OF UNIT)				
(b)	FLUES				
(c)	PROCESS OR GENERAL EXHAUST				
(d)	PROCESS OR GENERAL VENTS				
(e)	SKYLIGHT OR WINDOW				
(f)	EXHAUST HOOD				
(g) 1	OTHER – Out of Roof	40	298,000 cubic feet per hour	N/A	N/A

FLOW DIAGRAM

36. FLOW DIAGRAM INSTRUCTIONS:

(a) FLOW DIAGRAM MAY BE SCHEMATIC. ALL EQUIPMENT SHOULD BE SHOWN WITH EXISTING EQUIPMENT SO INDICATED.
(b) SHOW FLOW DIAGRAM OF PROCESS STARTING WITH RAW MATERIALS USED AND ENDING WITH FINISHED PRODUCT.
(c) IF MORE THAN ONE PROCESS IS INVOLVED TO MAKE FINISHED PRODUCT, SHOW EACH PROCESS AND WHERE THEY MERGE.
(d) INDICATED ALL POINTS IN PROCESS WHERE GASEOUS OR PARTICULATE POLLUTANTS ARE EMITTED.
(e) FLOW CHART CAN BE ATTACTED SEPARATELY IF NECESSARY. (DRAWINGS MAY BE SUBMITTED INSTEAD IF DESIRED.)
(f) SHOW PICKUP AND DISCHARGE POINTS FOR HANDLING OR CONVEYING EQUIPMENT.

See next page.

37. PLEASE INCLUDE THE FOLLOWING SUPPORTING MATERIALS WITH THIS APPLICATION:
ENVIRONMENTAL CHECKLIST IS ATTACHED (OR A COPY OF AN APPROVED ENVIORNMENTAL CHECKLIST OR EIS)
PROCESS DESCRIPTION
VENDOR PRODUCT INFORMATION

38. CERTIFICATION:
I,THE UNDERSIGNED, DO HEREBY CERTIFY THAT THE INFORMATION CONTAINED IN THE APPLICATION AND THE ACOMPANYING FORMS, PLANS, AND SUPPLEMENTAL DATA DESCRIBED HEREIN IS, TO THE BEST OF MY KNOWLEDGE, ACCURATE AND COMPLETE.

39. SIGNATURE		40. DATE
41. TYPE OR PRINT NAME Chuck Luce	42. TITLE Project Engineer	43. PHONE 206-357-1078

Puget Sound Clean Air Agency

110 Union Street, Suite 500
Seattle WA 98101-2038

ENVIRONMENTAL CHECKLIST

WAIT - You may not need to fill out the attached checklist.
Please read and check the following:

Because of the State Environmental Policy Act, the action for which you are filing a Notice of Construction and Application for Approval to this Agency requires the completion of an environmental checklist.

BUT: If you can answer "yes" to either of the following statements with respect to the action being proposed, the attached checklist need not be completed:

1. I have obtained a State, City, or County Permit and filled out an environmental checklist.

   ___ Yes   **X** No

   If you answered "yes", give State, City or County Department, and date, and attach a copy of the checklist.

   ____

2. An environmental checklist or assessment has previously been filled out for another agency.

   ___ Yes   **X** No

   If "yes", give agency and date, and attach a copy of the checklist.

   ____

If your answer to both of the above statements is "no", you must complete the attached environmental checklist.

Prepared by:

____
(Signature)

____
(Print Name)

____
(Title)

PUGET SOUND CLEAN AIR AGENCY

110 Union Street, Suite 500
Seattle, Washington 98101

Date: August 27, 2007

Proponent: **Puget Sound Clean Air Agency**

Project, Brief Title: Forge Furnace

Environmental Checklist

Purpose of Checklist:

The State Environmental Policy Act (SEPA), Chapter 43.21C RCW, requires all governmental agencies to consider the environmental impacts of a proposal before making decisions. An Environmental Impact Statement (EIS) must be prepared for all proposals with probable significant adverse impacts on the quality of the environment. The purpose of this checklist is to provide information to help you and the agency identify impacts from your proposal (and to reduce or avoid impacts from the proposal, if it can be done) and to help the agency decide whether an EIS is required.

Instructions for Applicants:

This environmental checklist asks you to describe some basic information about your proposal. Governmental agencies use this checklist to determine whether the environmental impacts of your proposal are significant, requiring preparation of an EIS. Answer the questions briefly, with the most precise information known, or give the best description you can.

You must answer each question accurately and carefully, to the best of your knowledge. In most cases, you should be able to answer the questions from your own observations or project plans without the need to hire experts. If you really do not know the answer, or if a question does not apply to your proposal, type “do not know” or “does not apply”. Complete answers to the questions now, may avoid unnecessary delays later.

Some questions ask about governmental regulations, such as zoning, shoreline, and landmark designations. Answer these questions if you can. If you have problems, the governmental agencies can assist you.

The checklist questions apply to all parts of your proposal, even if you plan to do them over a period of time or on different parcels of land. Attach any additional information that will help describe your proposal or its environmental effects. The agency may ask you to explain your answers or provide additional information reasonably related to determining if there may be significant adverse impact.

Use of checklist for non-project proposals:

Complete this checklist for non-project proposals, even though questions may be answered "does not apply". IN ADDITION, complete the SUPPLEMENTAL SHEET FOR NON-PROJECT ACTIONS (part D).

For non-project actions, the references in the checklist to the words "project", "applicant", and "property or site" should be read as "proposal", "proposer", and "affected geographic areas", respectively.

TO BE COMPLETED BY THE APPLICANT

A. BACKGROUND

1. Name of proposed project, if applicable:

   Forge Furnace

2. Name of applicant: **Jorgensen Forge Corporation**

3. Address and phone number of applicant and contact person:

   Name: **Charles H. Luce** Title: **Project Engineer**

   Firm: **Jorgensen Forge Corporation** Telephone: **(206) 357-1078**

   PO Box/Street: **8531 E. Marginal Way S**

   City/State/Zip: **Seattle, WA 98108**

4. Date checklist prepared: **August 27, 2007**

5. Agency requesting checklist: **Puget Sound Clean Air Agency**

6. Proposed timing or schedule (including phasing, if applicable).

   Complete by October 2007

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

   No

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

   None

9. Do you know whether applications are pending for governmental approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

   No

10. List any government approvals or permits that will be needed for your proposal, if known.

    Puget Sound Clean Air Agency Notice of Construction Order of Approval

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

Jorgensen Forge Corporation (Jorgensen) operates a steel forging facility in Seattle. Jorgensen intends to add a new forge furnace to heat steel billets before forging. This furnace will be in addition to existing furnaces.

Steel billets are milled before heating, eliminating any dust emissions from the furnace. Twenty percent of the emissions from the furnace exit through two furnace stacks. Total flow is 100,000 cubic feet per hour at 2,250ºF. Eighty percent of the emissions exhaust through the burner exhaust fan outlet. Flow is 198,000 cubic feet per hour at 450ºF.

12. Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.

8531 E. Marginal Way S

Seattle, WA 98108

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site ($\boxed{\text{flat}}$, rolling, hilly, steep slopes, mountainous, other):

b. What is the steepest slope on the site (approximate percent slope)?

Less than 1%

c. What general types of soils are found on the site (for example, clay, sand, $\boxed{\text{gravel}}$, peat, muck)? If you know the classification of agricultural soils, specify them, and note any prime farmland.

Most of the plant site is paved with concrete.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

No, old industrial area.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

None

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

No, all construction will occur on existing concrete pavement inside an existing building.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

No change

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

No change, most of the site is already paved with concrete.

2. AIR

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial, woodsmoke) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.

An increase of less than 6 tons per year of NO_x emissions, less than 4 tons per year of CO emissions, and less than 1 ton per year of all other criteria and toxic pollutants.

b. Are there any off-site sources of emissions or odor that may affect your proposal? If so, generally describe.

No

c. Proposed measures to reduce or control emissions or other impacts to air, if any:

Low-NO_x and regenerative burners.

3. WATER

a. Surface

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

No.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None

4) Will the proposal require surface water withdrawals or diversions? If yes, give general description, purpose, and approximate quantities, if known.

No

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

Unknown

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No

b. Ground

1) Will groundwater be withdrawn, or will water be discharged to groundwater? If yes, give general description, purpose, and approximate quantities, if known.

No

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the systems, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None

c. Water Runoff (including storm water)

1) Describe the source of runoff (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

No change

2) Could waste material enter ground or surface waters? If so, generally describe.

No

d. Proposed measures to reduce or control surface, ground, and runoff water impacts, if any:

No change

4. Plants

a. Indicate types of vegetation found on the site.

None

___ deciduous trees: ___ alder ___ maple ___ aspen
___ other (specify):

___ evergreen trees: ___ fir ___ cedar ___ pine
___ other (specify):

___ shrubs

___ grass

___ pasture

___ crop or grain

___ wet soil plants: ___ cattail ___ buttercup ___ bullrush
___ skunk cabbage ___ other (specify):

___ water plants: ___ water lily ___ eelgrass ___ milfoil
___ other (specify):

___ other types of vegetation (specify):

b. What kind and amount of vegetation will be removed or altered?

None

c. List threatened or endangered species known to be on or near the site.

None

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

None

5. Animals

a. Indicate birds and animals that have been observed on or near the site or are known to be on or near the site.

None

___ Birds: ___ hawk ___ heron ___ eagle ___ songbirds
___ other (specify):

___ Mammals: ___ deer ___ bear ___ elk ___ beaver
___ other (specify):

___ Fish: ___ bass ___ salmon ___ trout ___ herring ___ shellfish
___ other (specify):

b. List any threatened or endangered species known to be on or near the site.

None known

c. Is the site part of a migration route? If so, explain.

No

d. Proposed measures to preserve or enhance wildlife, if any:

None

6. Energy and Natural Resources

a. What kinds of energy (electric, natural gas, oil, woodstove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.

Natural gas will be used to fire the furnace. Electricity will be used for controls.

b. Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.

No

c. What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:

The project uses low fuel consumption burners.

7. Environmental Health

a. Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe:

No

1) Describe special emergency services that might be required.

Fire Department

2) Proposed measures to reduce or control environmental health hazards, if any:

None

b. Noise

1) What types of noise exist in the area that may affect your project (for example, traffic, equipment, operation, other)?

None

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example, traffic, construction, operation, other)? Indicate what hours noise would come from the site.

Fan and motor noise would be about the same as current levels.

3) Proposed measures to reduce or control noise impacts, if any:

Not applicable

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

Site – Steel melt shop, forge shop and machine shop.

Adjacent properties – Boeing wind tunnel, parking lot.

b. Has the site been used for agriculture? If so, describe.

No

c. Describe any structures on the site.

There are several buildings and equipment associated with the current production of forged and machined steel.

d. Will any structures be demolished? If so, what?

No

e. What is the current zoning classification of the site?

Heavy Industrial

f. What is the current comprehensive plan designation of the site?

Heavy Industrial

g. If applicable, what is the current shoreline master program designation of the site?

Urban

h. Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.

Industrial

i. Approximately how many people would reside or work in the completed project?

No more than one additional employee.

j. Approximately how many people would the completed project displace?

None

k. Proposed measures to avoid or reduce displacement impacts, if any:

Not Applicable

l. Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:

Not Applicable

9. Housing

a. Approximately how many units would be provided, if any? Indicate whether high- middle- or low-income housing.

None

b. Approximately how many units, if any, would be eliminated? Indicate whether high-middle- or low-income housing.

None

c. Proposed measures to reduce or control housing impacts, if any:

Not applicable.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

The new furnace will be 23 feet high but it will be inside an existing building that is 40 feet high. There will be no change to the exteria of the existing building.

b. What views in the immediate vicinity would be altered or obstructed?

None, no change

c. Proposed measures to reduce or control aesthetic impacts, if any:

Not Applicable

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No

c. What existing off-site sources of light or glare may affect your proposal?

None

d. Proposed measures to reduce or control light and glare impacts, if any:

Not applicable

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

None

b. Would the proposed project displace any existing recreational uses? If so, describe.

No

c. Proposed measures to reduce or control impacts on recreation, including recreational opportunities to be provided by the project or applicant, if any:

Not applicable

13. Historic and Cultural Preservation

a. Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.

No

b. Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.

None

c. Proposed measures to reduce or control impacts, if any:

Not applicable

14. Transportation

a. Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on-site plans, if any.

East Marginal Way S

b. Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?

No. The nearest public transit is about a mile.

c. How many parking spaces would the completed project have? How many would the project eliminate?

No change

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No change

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

No change

g. Proposed measures to reduce or control transportation impacts, if any:

Not applicable

15. Public Services

a. Would the project result in an increased need for public services (for example, fire protection, police protection, health care, schools, other)? If so, generally describe.

No

b. Proposed measures to reduce or control direct impacts on public services, if any:

Not applicable

16. Utilities

a. Indicate utilities currently available at the site:

X electricity	**X** telephone
X natural gas	**X** sanitary sewer
X water	___ septic system
X refuse service	___ other (specify):

b. Describe the utilities that are proposed for the project, the utility providing the service, and service, and the general construction activities on the site or in the immediate vicinity that might be needed.

Natural gas will be provided by Puget Sound Energy. Electrical power will be provided by Seattle City Light.

C. SIGNATURE

The above answers are true and complete to the best of my knowledge. I understand that the lead agency is relying on them to make its decision.

Signature: ____

Date Submitted: ____________________________________

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: JOR-GWC-070622
SAMPLE

Lab Sample ID: LE63A
LIMS ID: 07-12916
Matrix: Soil
Data Release Authorized:
Reported: 07/02/07

QC Report No: LE63-Anchor Environmental, LLC
Project: Jorgensen Furnace Waste Charact.
010128-01 TS
Date Sampled: 06/22/07
Date Received: 06/22/07

Percent Total Solids: 96.9%

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	06/25/07	6010B	06/29/07	7440-38-2	Arsenic	10	10	U
3050B	06/25/07	6010B	06/29/07	**7440-39-3**	**Barium**	0.8	**24.5**	
3050B	06/25/07	6010B	06/29/07	7440-43-9	Cadmium	0.5	0.5	U
3050B	06/25/07	6010B	06/29/07	**7440-47-3**	**Chromium**	1	**299**	
3050B	06/25/07	6010B	06/29/07	**7439-92-1**	**Lead**	5	**9**	
CLP	06/25/07	7471A	06/27/07	7439-97-6	Mercury	0.05	0.05	U
3050B	06/25/07	6010B	06/29/07	7782-49-2	Selenium	10	10	U
3050B	06/25/07	6010B	06/29/07	7440-22-4	Silver	0.8	0.8	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: LAB CONTROL

Lab Sample ID: LE63LCS
LIMS ID: 07-12916
Matrix: Soil
Data Release Authorized:
Reported: 07/02/07

QC Report No: LE63-Anchor Environmental, LLC
Project: Jorgensen Furnace Waste Charact.
010128-01 TS
Date Sampled: NA
Date Received: NA

BLANK SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Spike Found	Spike Added	% Recovery	Q
Arsenic	6010B	207	200	104%	
Barium	6010B	204	200	102%	
Cadmium	6010B	55.0	50.0	110%	
Chromium	6010B	52.9	50.0	106%	
Lead	6010B	206	200	103%	
Mercury	7471A	1.18	1.00	118%	
Selenium	6010B	208	200	104%	
Silver	6010B	51.2	50.0	102%	

Reported in mg/kg-dry

N-Control limit not met
Control Limits: 80-120%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TOTAL METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: LE63MB
LIMS ID: 07-12916
Matrix: Soil
Data Release Authorized:
Reported: 07/02/07

QC Report No: LE63-Anchor Environmental, LLC
Project: Jorgensen Furnace Waste Charact.
010128-01 TS
Date Sampled: NA
Date Received: NA

Percent Total Solids: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/kg-dry	Q
3050B	06/25/07	6010B	06/28/07	7440-38-2	Arsenic	5	5	U
3050B	06/25/07	6010B	06/28/07	7440-39-3	Barium	0.3	0.3	U
3050B	06/25/07	6010B	06/28/07	7440-43-9	Cadmium	0.2	0.2	U
3050B	06/25/07	6010B	06/28/07	7440-47-3	Chromium	0.5	0.5	U
3050B	06/25/07	6010B	06/28/07	7439-92-1	Lead	2	2	U
CLP	06/25/07	7471A	06/27/07	7439-97-6	Mercury	0.05	0.05	U
3050B	06/25/07	6010B	06/28/07	7782-49-2	Selenium	5	5	U
3050B	06/25/07	6010B	06/28/07	7440-22-4	Silver	0.3	0.3	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TCLP METALS
Page 1 of 1

Sample ID: JOR-GWC-070622
SAMPLE

Lab Sample ID: LG59A
LIMS ID: 07-14031
Matrix: Soil
Data Release Authorized:
Reported: 07/16/07

QC Report No: LG59-Anchor Environmental, LLC
Project: Jorgensen Furnace Waste Charatct.
010128-01 TS
Date Sampled: 06/22/07
Date Received: 06/22/07

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
1311	07/11/07	6010B	07/13/07	7440-38-2	Arsenic	0.2	0.2	U
1311	07/11/07	6010B	07/13/07	**7440-39-3**	**Barium**	0.02	**0.06**	
1311	07/11/07	6010B	07/13/07	7440-43-9	Cadmium	0.01	0.01	U
1311	07/11/07	6010B	07/13/07	7440-47-3	Chromium	0.02	0.02	U
1311	07/11/07	6010B	07/13/07	7439-92-1	Lead	0.1	0.1	U
1311	07/12/07	7470A	07/12/07	7439-97-6	Mercury	0.0001	0.0001	U
1311	07/11/07	6010B	07/13/07	7782-49-2	Selenium	0.2	0.2	U
1311	07/11/07	6010B	07/13/07	7440-22-4	Silver	0.02	0.02	U

U-Analyte undetected at given RL
RL-Reporting Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TCLP METALS
Page 1 of 1

Sample ID: JOR-GWC-070622
DUPLICATE

Lab Sample ID: LG59A
LIMS ID: 07-14031
Matrix: Soil
Data Release Authorized:
Reported: 07/16/07

QC Report No: LG59-Anchor Environmental, LLC
Project: Jorgensen Furnace Waste Charatct.
010128-01 TS
Date Sampled: 06/22/07
Date Received: 06/22/07

MATRIX DUPLICATE QUALITY CONTROL REPORT

Analyte	**Analysis Method**	**Sample**	**Duplicate**	**RPD**	**Control Limit**	**Q**
Arsenic	6010B	0.2 U	0.2 U	0.0%	+/- 0.2	L
Barium	6010B	0.06	0.06	0.0%	+/- 0.02	L
Cadmium	6010B	0.01 U	0.01 U	0.0%	+/- 0.01	L
Chromium	6010B	0.02 U	0.02 U	0.0%	+/- 0.02	L
Lead	6010B	0.1 U	0.1 U	0.0%	+/- 0.1	L
Mercury	7470A	0.0001 U	0.0001 U	0.0%	+/- 0.0001	L
Selenium	6010B	0.2 U	0.2 U	0.0%	+/- 0.2	L
Silver	6010B	0.02 U	0.02 U	0.0%	+/- 0.02	L

Reported in mg/L

*-Control Limit Not Met
L-RPD Invalid, Limit = Detection Limit

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TCLP METALS
Page 1 of 1

Sample ID: JOR-GWC-070622
MATRIX SPIKE

Lab Sample ID: LG59A
LIMS ID: 07-14031
Matrix: Soil
Data Release Authorized:
Reported: 07/16/07

QC Report No: LG59-Anchor Environmental, LLC
Project: Jorgensen Furnace Waste Charatct.
010128-01 TS
Date Sampled: 06/22/07
Date Received: 06/22/07

MATRIX SPIKE QUALITY CONTROL REPORT

Analyte	Analysis Method	Sample		Spike	Spike Added	% Recovery	Q
Arsenic	6010B	0.2	U	10.5	10.0	105%	
Barium	6010B	0.06		9.53	10.0	94.7%	
Cadmium	6010B	0.01	U	2.54	2.50	102%	
Chromium	6010B	0.02	U	2.45	2.50	98.0%	
Lead	6010B	0.1	U	9.9	10.0	99.0%	
Mercury	7470A	0.0001	U	0.0011	0.0010	110%	
Selenium	6010B	0.2	U	10.7	10.0	107%	
Silver	6010B	0.02	U	2.49	2.50	99.6%	

Reported in mg/L

N-Control Limit Not Met
H-% Recovery Not Applicable, Sample Concentration Too High
NA-Not Applicable, Analyte Not Spiked

Percent Recovery Limits: 75-125%

ANALYTICAL RESOURCES INCORPORATED

INORGANICS ANALYSIS DATA SHEET
TCLP METALS
Page 1 of 1

Sample ID: METHOD BLANK

Lab Sample ID: LG59MB
LIMS ID: 07-14031
Matrix: Soil
Data Release Authorized:
Reported: 07/16/07

QC Report No: LG59-Anchor Environmental, LLC
Project: Jorgensen Furnace Waste Charatct.
010128-01 TS
Date Sampled: NA
Date Received: NA

Prep Meth	Prep Date	Analysis Method	Analysis Date	CAS Number	Analyte	RL	mg/L	Q
1311	07/11/07	6010B	07/13/07	7440-38-2	Arsenic	0.2	0.2	U
1311	07/11/07	6010B	07/13/07	7440-39-3	Barium	0.02	0.02	U
1311	07/11/07	6010B	07/13/07	7440-43-9	Cadmium	0.01	0.01	U
1311	07/11/07	6010B	07/13/07	7440-47-3	Chromium	0.02	0.02	U
1311	07/11/07	6010B	07/13/07	7439-92-1	Lead	0.1	0.1	U
1311	07/12/07	7470A	07/12/07	7439-97-6	Mercury	0.0001	0.0001	U
1311	07/11/07	6010B	07/13/07	7782-49-2	Selenium	0.2	0.2	U
1311	07/11/07	6010B	07/13/07	7440-22-4	Silver	0.02	0.02	U

U-Analyte undetected at given RL
RL-Reporting Limit

SEACOR

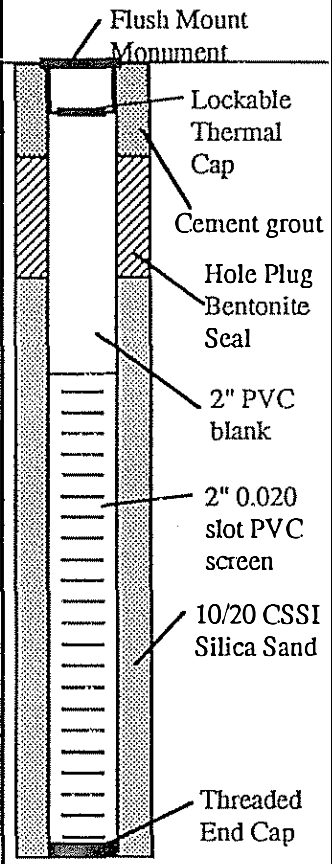
BORING LOG

BORING: MW-16
PAGE 1 of 1

PROJECT: FORGE FACILITY AREA 1
LOCATION: 8531 E. MARGINAL WAY S. SEATTLE, WASHINGTON
SURFACE ELEVATION:
CASING TOP ELEVATION: 48.96'
START: 8-29-92 0900
FINISH: 8-29-92 1015
SAMPLER: SIVILLE/POSTLETHWAITE
MONITORING DEVICE: MICROTIP PID
SUBCONTRACTOR AND EQUIPMENT: GEOBORING & DEVELOPMENT, INC.; 8" O.D. HSA
COMMENTS: SOIL SAMPLES CONTINUOUSLY COLLECTED USING A 3" O.D. SPLIT SPOON SAMPLER LINED WITH 2.5" X 6" BRASS SLEEVES

Penetration Results Blows 6"-6"-6"	Sample Depth Interval, feet	PID Reading (ppm)	Depth Below Surface, feet	Lithologic Description	Unified Soil Classification
Hand Auger to 5 feet			0	CONCRETE	
		15.0 15.2 14.1 14.0 23.0 13.5 0.5 5.8	5	Brown arkosic SAND, no fines/gravels, subrounded, very fine to coarse-grained, very well graded, very loose to loose, dry	SW
6/6/9		0			
4/6/8		0			
6/7/4		38.4		gray some fine gravel, moist to wet	
2/2/1		33.4	10	Gray SAND, very fine-grained, poorly graded, some silt toward the bottom, wet, petroleum-like odor	SP
2/2/4		0		Dark gray Clayey SILT with organics, slightly plastic, stiff, moist to wet	ML
1/3/4		12.8 0			
3/4/5		0	15	Gray SAND, very fine-grained, poorly graded, loose, wet	SP
				Boring terminated at 16 feet Groundwater encountered at approximately 11.5 feet	
			20		
			25		

Boring Abandonment/ Well Construction Details



00075-018-01

SEACOR

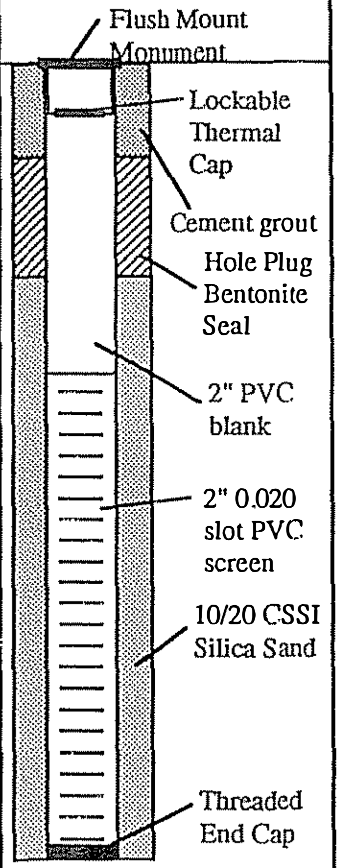
BORING LOG

BORING: MW-18
PAGE 1 of 1

PROJECT FORGE FACILITY AREA 1
LOCATION 8531 E. MARGINAL WAY S. SEATTLE, WASHINGTON
SURFACE ELEVATION
CASING TOP ELEVATION 48.77'
START 8-29-92 1220
FINISH 8-29-92 1400
SAMPLER SIVILLE/POSTLETHWAITE
MONITORING DEVICE MICROTIP PID
SUBCONTRACTOR AND EQUIPMENT GEOBORING & DEVELOPMENT, INC.; 8" O.D. HSA
COMMENTS SOIL SAMPLES CONT UOUSLY COLLECTED USING A 3" O.D. SPLIT SPOON SAMPLER LINED WITH 2.5" X 6" BRASS SLEEVES

Penetration Results Blows 6"-6"-6"	Sample Depth Interval, feet	PID Reading (ppm)	Depth Below Surface, feet	Lithologic Description	Unified Soil Classification
Hand Auger to 5'			0	CONCRETE	
		0		Brown arkosic SAND, no fines/gravels, sub-rounded, very fine to coarse-grained, very well graded, medium dense, dry	SW
		0		Gray Silty SAND, very fine-grained, dense, dry	SP
		0		Brown arkosic SAND, no fines/gravels, sub-rounded, very fine to coarse-grained, very well graded, medium dense, dry	SW
		0			
		0			
		0			
		0			
		0	5		
4/7/8		0			
9/7/7		0			
				gray Gray SAND, very fine-grained, dry	SP
6/4/3		0		Gray SAND, very fine-grained, as above, dry	SW
1/3/2		0	10	Dark gray Clayey SILT with organics, very stiff, slightly plastic, loose, moist	ML
3/5/6		0		Dark gray SAND, no gravels, few fines, very fine-grained, poorly graded, medium dense, wet	SP
4/4/3		0			
4/5/5		0	15	Boring terminated at 16 feet	
				Groundwater encountered at approximately 11.5 feet	
			20		
			25		

Boring Abandonment/ Well Construction Details



00075-018-01

00075-018-01.0

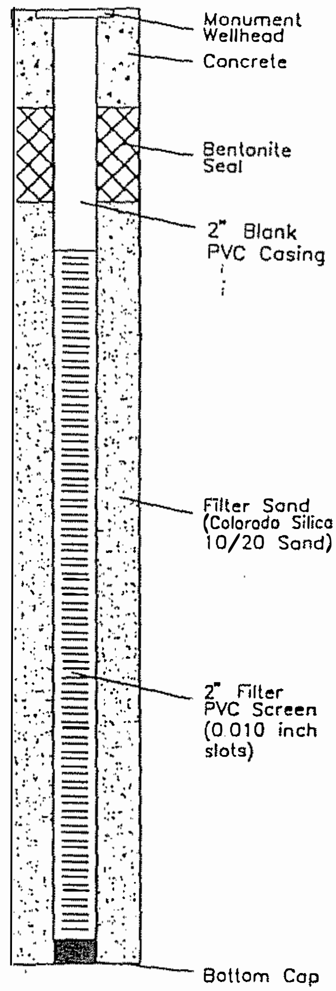
SEACOR BORING LOG

BORING: MW-30
PAGE 1 OF 1

PROJECT JORGENSEN FORGE
LOCATION
SURFACE ELEVATION –
CASING TOP ELEVATION –
START 1/30/94 1002
FINISH 1/30/94 1110
SAMPLER DELL'AGNESE
MONITORING DEVICE CENTURY OVA
SUBCONTRACTOR AND EQUIPMENT CASCADE DRILLING, CME 55, 8.25" O.D. HSA
COMMENTS SAMPLED WITH A 1.5' LONG BY 3" O.D. SPLIT SPOON SAMPLER LINED WITH BRASS SLEEVES, SC#=AA0622

PENETRATION RESULTS BLOWS 6"/6"/6"	Sample Depth Interval, feet	PID Reading (ppm)	Depth Below Surface, feet	Lithologic Description	Unified Soil Classification
			0	Concrete	
				Fine SAND, Brown 7.5YR 4/2, Trace Silt, Moist (0.95.5.0) No Odor Detected	SP
				SILT, Black 7.5YR 2.5/1, with some Fine Sand, Moist (0.30.70.0) some organic particles	ML
				Fine SAND, Brown 7.5YR 4/4, Trace Silt, Moist (0.90.10.0)	SP
6/6/8		110		SILT, Black 7.5YR 2.5/1, with some Fine Sand, Moist (0,30,60.1,)	ML
			5	Medium to Fine SAND, Dark Gray 7.5YR 4/1, Trace Silt, Loose, Moist (0.95.5.0)	SP
7/9/8		240			
			10	Wet at 9.75 feet	
				No samples taken in saturated zone Medium to Fine Sands, Dark Gray 7.5YR 4/1, Wet (0.100.0.0) (Grab sample on auger flight)	
			15		
			20		
			25		

Well Construction Details



00075-018-01

DWG:JOR1601L

Bloomengineering
GLOBAL ENERGY AND
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5460 Horning Road • Pittsburgh, PA 15236-2822 • Phone: 412-653-3500 • Fax: 412-653-2253 • Email: info@bloomeng.com • www.bloomeng.com

September 30, 2008

Jorgensen Forge
8531 East Marginal Way South
Seattle, WA 98108

Attention: Charles H Luce
Plant Engineer

Subject: NOx Emissions
F-11 Nutec-Bickley Forge Furnace (Regenerative)
Bloom Project OO 1006-600

Dear Chuck:

Under the subject reference, new regenerative burners were sold by Bloom Engineering Co to Nutec-Bickley for the new F-11 furnace in the forge shop at Jorgensen. It is my understanding that the burners failed to achieve a standard of 75ppm (3% O_2) NOx during a recent operational test.

To determine potential NOx emissions, the burners and furnace must be looked at as a system operating together. The burner operation must be examined in relation to the physical characteristics of the furnace as well as the furnace operating parameters. Such items as burner operating mode, burner spacing vs furnace wall dimensions, type of fuel utilized, furnace operating temperatures, and combustion air preheat all have an effect on the rate of NOx generation.

The techniques used, by Bloom Engineering, to arrive at predicted NOx emissions, are the result of seventy five years of research, development, design and field applications experience. Bloom is regarded as the leader in low NOx combustion equipment for high temperature thermal processes.

Bloom's process of burner low NOx development begins with an engineering study of Computational Fluid Dynamics (CFD) computer simulations of alternative burner designs. These designs utilize our existing technology as a starting basis. After the CFD simulations have been studied, prototypes of the best design candidates are built and test fired in Bloom's combustion laboratory. This laboratory is one of the largest privately funded installations of its type in North America.

The NOx emissions in the controlled laboratory environment are compared against the computer predictions. Appropriate design refinements are made to the prototype to optimize burner performance. The burners are then applied in field situations with performance checked against the computer model. The iteration of the model vs burner performance is a carefully engineered process to ensure all factors influencing emissions have been properly quantified. The resulting model can then be extrapolated to cover virtually the entire spectrum of normal furnace configurations and operating parameters.

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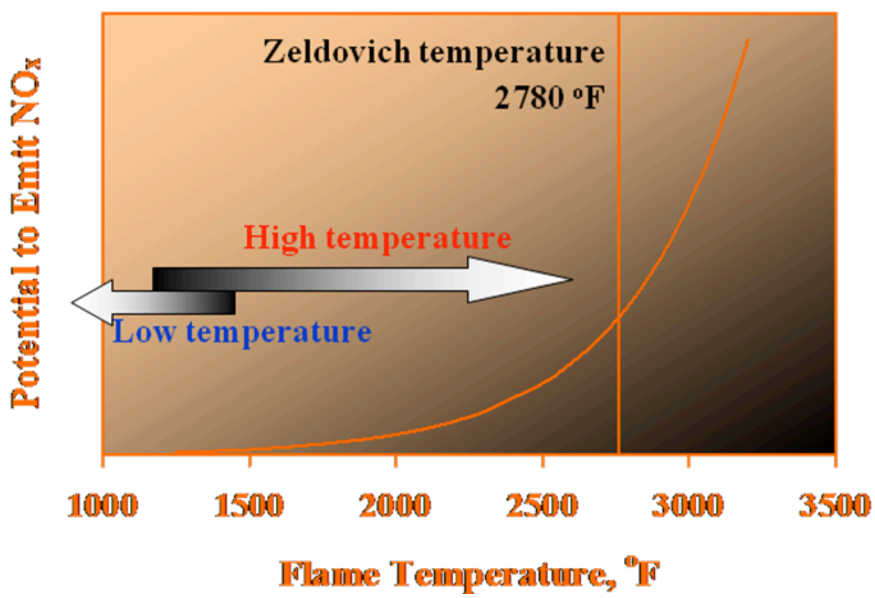
After an examination of the furnace operating conditions during the time of the test, it is our recommendation to change the operating configuration of the burner system to that of the Ultra low NOx Lumiflame mode. This mode of operation will involve the burner being in the deep air staged mode. Under this mode, the air is partially mixed with the fuel and allowed to combust over a period of time. This has the result of cooling the flame down thereby dramatically reducing the NOx. A graph showing the dependence of the potential to create NOx vs flame temperature is shown below; to illustrate the effectiveness of air staged combustion.



NOx Increase With Flame Temperature

Since the combustion reaction is still totally within the furnace, the heating efficiency is not affected by this mode.

A qualified Bloom combustion technician will be on-site at Jorgensen to assist with the proper tuning of the furnace to ensure proper operation in the Lumiflame mode.

Yours truly,

Anthony G Fennell PE
BLOOM ENGINEERING CO, INC
Western Region Manager

From: Kris Hansen [mailto:khansen@hoeflernet.com]
To: Desberg,Wayne; Luce, Chuck
CC: Angela Hansen; Susan Lyon; Steve Fryberger
Sent: 2008, 12.04 Thu, 16:50:31
Subject: Ramping tests Jorgensen Forge Process Data

Attachments:
Jorgensen - Ramping tests- With Graphs.pdf

Wayne – Attached are the results of the Ramping Tests. I put the results in a graphical format because the results vary with time and I thought that PSCAA might be interested in seeing how the results varied over the ramping period. As you can see there were no excursions over the emission limits during the ramping period. The bias corrected average results over the 3 hour period are also included

As Angie addressed in her email yesterday, we hope to have the report to you next week. Let me know if you have any questions or comments on the information presented in the attachments.

Thanks,
Kris
Kris Hansen, QEP
Sr. Consultant
AmTest Air Quality,
a Division of Hoefler Consulting Group
PO Box 525
Preston, WA 98050
425-222-7746
425-222-7849 (fax)
khansen@hoeflernet.com
www.amtestairquality.com

From: Desberg,Wayne [mailto:wdesberg@JorgensenForge.com]
Sent: Tuesday, December 02, 2008 7:13 PM
To: Kris Hansen; Luce, Chuck
Cc: Angela Hansen; Susan Lyon; Steve Fryberger
Subject: RE: Jorgensen Forge Process Data

Kris,

How are we coming on getting the report from the testing coming along? I'd like to get this out to the Agency as soon as possible.

Thks

Wayne Desberg
Engineering Manager
Jorgensen Forge Corp.
8531 East Marginal Way South
Seattle, WA 98108-4018
206-300-7235

From: Kris Hansen [mailto:khansen@hoeflernet.com]
Sent: Monday, November 24, 2008 4:13 PM
To: Luce, Chuck; Desberg,Wayne
Cc: Angela Hansen; Susan Lyon; Steve Fryberger
Subject: Jorgensen Forge Process Data

Chuck and Wayne – I have input the results from the recent tests and it appears that you will pass at all sites. I will forward these results to you as soon as they are QA'd. Based on my understanding of our teleconference with PSCAA prior to testing, I was not planning to do M19 calculations to determine the theoretical airflow, even though this is discussed in the test plan. I doubt if those calculations would be very accurate without corresponding airflow measurements at the preheater exhaust. It was my understanding that they were satisfied with the lb/1000 therms emission factor that was determined in the 1st set of testing and that all they really cared about was that the forge exhausts met the emission concentration limits corrected to 3% oxygen.

We should however supply some process information to go along with the testing. Do you have a record of the fuel flow rate during testing? Testing was performed on November 21 and the run times were 0820-0920, 0939-1039, and 1052-1152, for runs 1, 2, and 3, respectively. Other information with respect to forge operating conditions, such as temperatures and process rates, would also be helpful. Generally the purpose of this type of information is so that if the agency does an inspection they can ascertain that the process is operating in a similar manner as it was during the compliance testing. If you could please email me a PDF of the process information I would appreciate it.

Thanks,
Kris

Kris Hansen, QEP
Sr. Consultant
AmTest Air Quality,
a Division of Hoefler Consulting Group
PO Box 525
Preston, WA 98050
425-222-7746
425-222-7849 (fax)
khansen@hoeflernet.com
www.amtestairquality.com

From: Toocheck, Dave [mailto:dtoocheck@bloomeng.com]
To: Arechavaleta, Arturo; Luce, Chuck
CC: Barrera, Adalberto; Maldonado, Pablo; Dormire, John; O'Connor, Steven
Sent: 2007, 06.20 Wed, 17:03:39
Subject: RE: 2036 RE: NOx info that you've requested

Attachments:
jorgensen forge nox estimate.tif

Gentlemen,

Attached is the information regarding NOx emissions that you have requested.

This is a guaranteed value based on specific operating parameters outlined on the attached. Please review this information in detail. If you should find any discrepancies with the inputs that we have used to generate this estimate, please advise so that we can assure the accuracy of the data that we have presented you.

Should you have any questions, please don't hesitate to contact us.

Dave Toocheck
C: 412 760 8721

From: Arechavaleta, Arturo [mailto:ArturoArechavaleta@nutecbickley.com]
Sent: Tuesday, June 19, 2007 1:38 PM
To: cluce@jorgensenforge.com; Toocheck, Dave
Cc: Barrera, Adalberto; Maldonado, Pablo; Dormire, John; O'Connor, Steven
Subject: 2036 RE: NOx info that you've requested

Dave

Thanks for informing us abut this.   Please copy us on all correspondence with Jorgensen

We will forward the exact information you give us on exhaust gases to Jorgensen. If any safety factor is needed , please add on your side. Since if the equipment does not perform as offered, we will get back to you

Best Regards

Arturo Arechavaleta V.
Of +52 81 81510800 ext 318
Cel +52 81 82540633
http://www.nutecbickley.com

From: Toocheck, Dave [mailto:dtoocheck@bloomeng.com]
Sent: Monday, June 18, 2007 3:33 PM
To: cluce@jorgensenforge.com
Cc: O'Connor, Steven; Dormire, John; Maldonado, Pablo; Arechavaleta, Arturo
Subject: NOx info that you've requested

Hi Chuck,

Just wanted to follow up with you real quickly about your request for NOx numbers.

I thought that Steve was going to be in the office for a little while last week and stated that we could provide this data to you by the end of the week, but, I was wrong.

I forgot that we had Steve running across the country doing presentations to the western chapter of the AIST last week and he didn't get to this item yet.

I did talk to Steve today, and he assured me that we are in the queue and he hopes to get to us by Wed.

Hope that this won't create a humungous problem for you.

We will make sure that we copy Nutec on our results. Since the contract that you have for the whole furnace is with them, you may want to ask them if they plan on adding any safety factors to our numbers.

We'll get you the numbers soon.

Dave
C: 412 760 8721

From: Jay.Willenberg@CH2M.com
To: Desberg,Wayne; Luce, Chuck
Sent: 2008, 09.08 Mon, 16:58:15
Subject: RE: Jorgensen Forge F-11 Furnace air testing

Attachments:
image001.gif
image002.jpg
image003.gif
9685btr_jmw2.doc
Jorgensen_NOC 081507.doc

The 75 ppm@ 3%O2 came from the vendor guarantee of 0.090 lb/MMBtu; see Section G of the attached background document. Also see the NOx section in the application, starting on page 4.

For items 6 and 7 I would use 0.090 lb/MMBtu and the annual heat input to the furnace.

Jay Willenberg
CH2M HILL
jwillenb@ch2m.com <mailto:jwillenb@ch2m.com>
Phone 425 233 3532
Cell 425 922 5955

From: Desberg,Wayne [mailto:wdesberg@JorgensenForge.com]
Sent: Monday, September 08, 2008 8:36 AM
To: Willenberg, Jay/SEA; Luce, Chuck
Subject: RE: Jorgensen Forge F-11 Furnace air testing

Thanks for the information. Yes, the 77 ppm NOx is the corrected number. I was looking at the general permit, rather than the F-11 specific one, although ultimately we'll need to figure out emission factors- items # 6 and # 7. (Reason why I asked is while these are 17mmbtu/hr burners they only run at a fraction of that and are program limited to a max. of 60% of the 17 or 12mmbtu/hr. so lbs/hr emissions are less than what you'd get at the calculated 17mmbtu/hr max operation at max burner "technical" capacity which is impossible to use for any length of time unless you left the door wide open and you'd probably burn the unit down in a short time.

Curious, where did the 75 NOx ppm limit actually come from? Provided by us or some other source?

Thks for your time-

Wayne Desberg
Plant Engineering Manager
Jorgensen Forge

8531 East Marginal Way South
Seattle, WA 98108

206-300-7235

From: Jay.Willenberg@CH2M.com [mailto:Jay.Willenberg@CH2M.com]
Sent: Monday, September 08, 2008 8:19 AM
To: Desberg,Wayne; Luce, Chuck
Subject: RE: Jorgensen Forge F-11 Furnace air testing

Wayne

I not sure what you mean. I think that the permit says

If the 77 ppm is corrected to 3%O2, we have a problem.

Call me if you have any questions.

Jay Willenberg
CH2M HILL
jwillenb@ch2m.com <mailto:jwillenb@ch2m.com>
Phone 425 233 3532
Cell 425 922 5955

From: Desberg,Wayne [mailto:wdesberg@JorgensenForge.com]
Sent: Monday, September 08, 2008 7:46 AM
To: Willenberg, Jay/SEA; Luce, Chuck
Subject: Jorgensen Forge F-11 Furnace air testing

Jay,

Chuck unfortunately is out today but the air test results from F-11 came back in the 77ppm range for NOx which Chuck indicated is out of spec. From what little information I've got on the permit, the permit is in lbs/hr so I'd think we'll have to calculate total airflow or therms being used to get the lbs/hr number???

Thks
Wayne Desberg
Plant Engineering Manager
Jorgensen Forge

8531 East Marginal Way South
Seattle, WA 98108

206-300-7235

From: Luce, Chuck
Sent: Tuesday, August 12, 2008 1:26 PM
To: Desberg,Wayne
Subject: FW: Source Test Plan Approved.

From: Brian Renninger [mailto:BrianR@pscleanair.org]
Sent: Tuesday, August 12, 2008 11:50 AM
To: Luce, Chuck; Jay.Willenberg@CH2M.com
Subject: Source Test Plan Approved.

Chuck,

I have read through Jay's e-mail and the Amtest's additional responses to my questions related to the source test plan originally submitted on July 30, 2008. Based on my review I believe my questions have been adequately addressed. In summary:

- Three 60-minute tests will be conducted.
- The three stacks will be tested simultaneously for O2, CO2 (Method 3A), NOX (Method 7E), CO (Method 10);
- Flow at the preheater stack will also be measured simultaneously (method 2 I assume);
- Flow from the two furnace exhaust stacks will be estimated by subtracting the measured flow from the preheater stack from the total flow as estimated using Method 19 F-Factors for natural gas and an assumed gas heat content of 1030 dscf/MMBtu) and apportioning equal amounts of the remaining gas to each furnace stack;
- The relatively rapid (30-second) cycle time between burner firings compared with the 1-hour test period should render the influence of burner cycling inconsequential to the test results;
- Concentrations and flows will be corrected to 3% oxygen prior to calculating the total concentration from the furnace;
- The total concentrations from the furnace will be estimated by the measured concentrations apportioned according to the relative flow from each stack (as measured or estimated above).

I will append this e-mail, Jay's e-mail, and Amtest's responses to my questions to the originally submitted source test plan and consider the plan approved.

Sincerely,

Brian Renninger

Engineer
Puget Sound Clean Air Agency

206.689.4077
brianr@pscleanair.org
1904 Third Avenue, Suite 105
Seattle, WA 98101

"Working together for clean air"
www.pscleanair.org

From: Jay.Willenberg@CH2M.com [mailto:Jay.Willenberg@CH2M.com]
Sent: Monday, August 11, 2008 4:00 PM
To: Brian Renninger; cluce@JorgensenForge.com
Subject: RE: Burner Cycles during Test

Brian

After reading you recent email concerning testing Jorgensen's new furnace I think a better overall process description will help also attached is AmTest's response to your questions.

Furnace operation

The furnace is a large refectory lined rectangular room sized chamber with a door that opens in the front and two burners mounted high on the back wall, as shown in Figure 1.

Figure 1 Furnace Under Construction

The two burners are regenerative type burners that alternate on and off, with cycle nominal times of about 30 seconds. While one burner (Burner A) is operating exhaust gas from the furnace is drawn back through the other burner (Burner B) and through ceramic media (regenerator or preheater) before exhausting out the common stack. As the exhaust gas is drawn through the media it is cooled from about 2200°F to about 400°F, see Figure 2. At the end of the cycle the directions of flow are switched. With the combustion air being preheated by the regenerator before entering the burner (B) and the exhaust gas now passes through the other burner and its regenerator is preheated.

Excess exhaust gas is vented through three small exhaust ports along either side wall. The three exhaust ports on each side are ducted to common stacks on each side that vent to the atmosphere. The exhaust gas enters these two stacks at about 2200°F and there is no heat recovery before venting to the atmosphere. The two exhaust stacks are designed and tuned to have equal air flows.

Figure 2 Burner Operation

Testing

Because of the extreme high temperatures in the two exhaust ducts, total flow will be determined by EPA Method 19 using fuel factor of 8710 dscf/MMBtu for natural gas and the accepted heat content of 1030 Btu/scf for natural gas. The total flow will be adjusted to 3% O_2. The flow out the regenerator (pre-heater) will be determined using standard EPA Method 1-4 procedures and adjusted to standard conditions and 3% O_2. To determine the flow each of the exhaust stacks the corrected regenerator flow rate will be subtracted from the total flow and divided by two (the number of exhaust stacks).

The concentrations of CO and NOx will be measured in all three ducts and corrected to 3% O_2. The average furnace concentration will then be determined by taking a flow weighted average of the three measurements according to the following equation.

$$C_T = C_A * \frac{A_A}{(A_A + A_B + A_C)} + C_B * \frac{A_B}{(A_A + A_B + A_C)} + C_C * \frac{A_C}{(A_A + A_B + A_C)}$$

Where

C_A = the concentration for emission point A (preheater) corrected to 3% O_2,

C_B = the concentration for emission point B (exhaust duct 1) corrected to 3% O_2,
C_C = the concentration for emission point C (exhaust duct 2) corrected to 3% O_2,
C_T = the combined concentration for points A, B, and C,
A_A = the measured airflow rate for emission point A corrected to standard conditions and corrected to 3% O_2,
A_B = the theoretical airflow rate for emission point B corrected to standard conditions and corrected to 3% O_2, and
A_C = the theoretical airflow rate for emission point C corrected to standard conditions and corrected to 3% O_2,

Three 60-minute simultaneous stack tests will be conducted on the unit. Because cycle time (about 30 seconds) is short compared to the test time no effort will be made to coordinate the test start and finish with the burner cycle.

Please contact Chuck or me if you have any additional questions.

Thanks

Jay Willenberg
CH2M HILL
jwillenb@ch2m.com <mailto:jwillenb@ch2m.com>
Phone 425 233 3532
Cell 425 922 5955

-----Original Message-----
From: Brian Renninger [mailto:BrianR@pscleanair.org]
Sent: Monday, August 11, 2008 8:37 AM
To: Luce, Chuck; Willenberg, Jay/SEA
Subject: Burner Cycles during Test

Chuck,

Another consideration on the source test plan.

I don't know how fast the cycle rate between the two burners is but it is possible that where the test begins and ends in a cycle could influence the results. Unless the cycle time is pretty rapid some effort should probably be made to begin and end the test runs at the beginning of a firing cycle and end at the end of a firing cycle.

Brian Renninger

Engineer
Puget Sound Clean Air Agency

206.689.4077
brianr@pscleanair.org
1904 Third Avenue, Suite 105
Seattle, WA 98101

"Working together for clean air"
www.pscleanair.org

Regenerative Burners- Are They Worth It?

David G. Schalles
VP-Technical Services
Bloom Engineering Company, Inc.
5460 Horning Road
Pittsburgh, PA 15236
Tel:412-653-3500 x3205
E-mail: dschalles@bloomeng.com

Abstract

Regenerative burner systems for high temperature furnaces in the Steel, Aluminum and related industries have now been on the market for over 20 years. Despite the dramatic potential gains in fuel efficiency and furnace productivity, industry acceptance remains relatively slow. Of particular current interest is the potential for reduction of CO2 emissions through the use of these systems.

Plant personnel are often reluctant to pursue the installation of Regenerative systems, for a variety of reasons. Often they cite high initial costs and perceived additional maintenance as the reasons for declining to install such systems. However, it can be shown that in many instances, the initial investment can be recovered in relatively short times and the ongoing fuel savings vastly outweighs the added maintenance costs. Some guidelines will be presented to assist in identifying the most promising target applications.

This paper will review the performance capabilities of currently available burner systems and then discuss the practical implications associated with their use. Examples of various successful furnace applications as well as experience with alternate fuels will be presented.

Scope of this paper

The following is intended to provide a general discussion of the current state of the art in commercially available periodic-type (flow reversal) Regenerative burner systems utilizing ceramic heat storage media. Furthermore, the discussion primarily covers applications to high temperature furnaces, defined as furnaces with operating temperatures in the approximate range of 1000 to 1400^{o}C.

Introduction

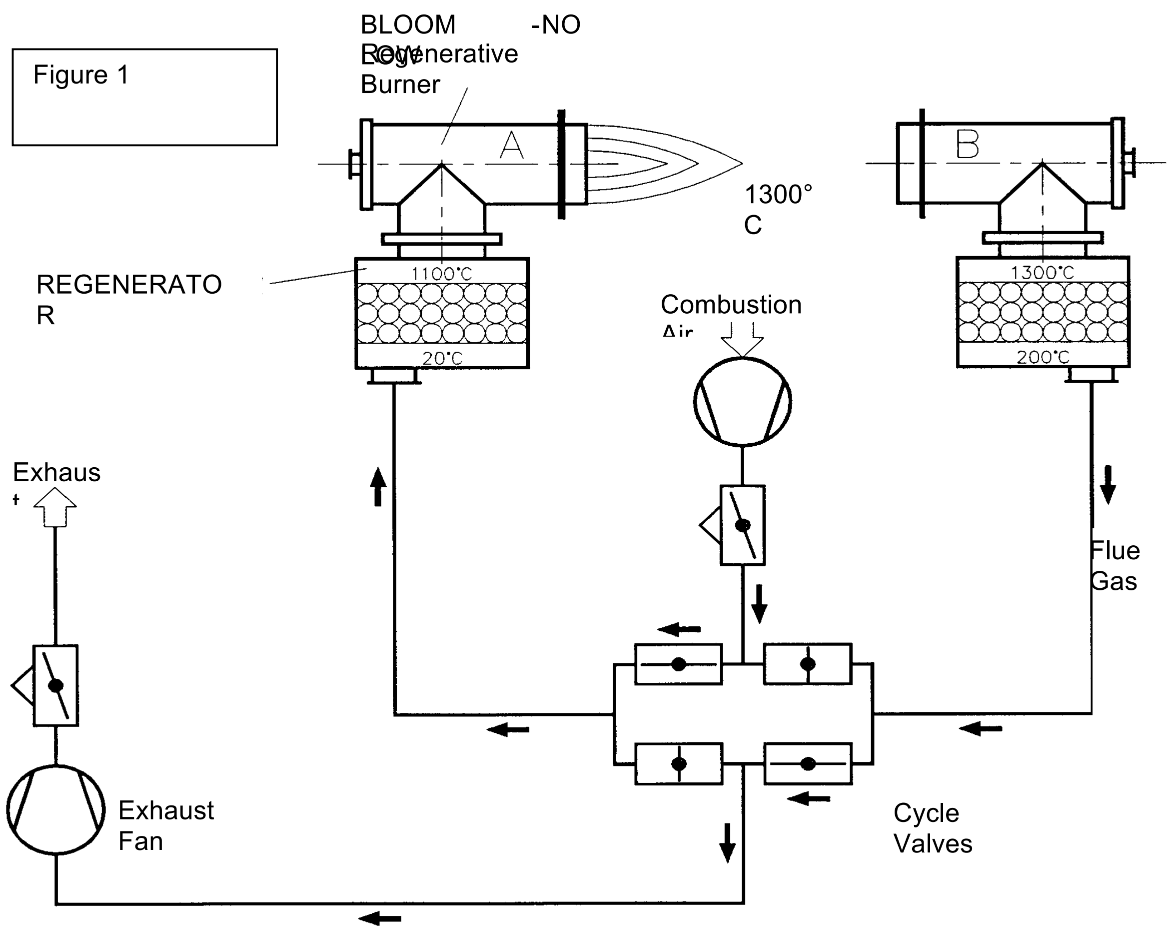
Regenerative burner systems have been commercially available for high temperature heating furnaces for about 20 years. There are in excess of 100 furnaces in the North America equipped with Regenerative combustion systems of various types. Despite the proven benefits of ultra high fuel efficiency and high productivity, many other plants remain reluctant to adopt this technology.

The chief reasons for avoiding Regenerative technology have been high NO_X emissions, excessive maintenance and initial cost. For example, some early systems had NO_X emissions well in excess of 840 ppmv @ 3%O_2 (1.0 lb/MM BTU-HHV). Most new projects now require emissions of 84 ppmv @ 3%O_2 (0.1 lb/MM BTU-HHV) or less. Several years ago, exhaust gas recirculation (EGR) systems were developed which achieved acceptable NO_X values, but resulted in additional costs, maintenance and efficiency penalties. Maintenance costs for Regenerative burners and heat-exchange media have in some cases substantially offset the fuel savings.

Finally, higher initial equipment costs have caused some users to avoid Regenerative systems, despite the typical 50-60% fuel savings available. Recent large increases in the cost of energy in North America has lead to an increased interest level in high efficiency combustion systems, and has significantly improved the payback times for such equipment. For example, a typical cold-air aluminum melting furnace can often be converted to Regenerative firing with a net payback time of well under one year, with all factors such as installation and maintenance factored in.

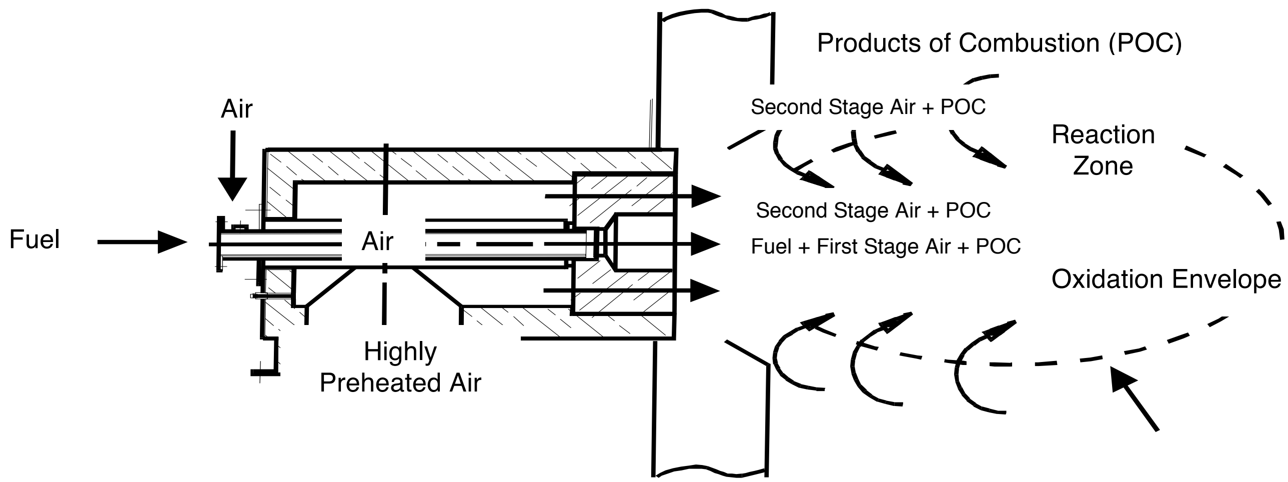
Although the cycling Regenerative-type burner is now rather well known, a simplified schematic diagram is provided for reference. Most manufacturers are designing their systems for reversal times in the range of about 20 seconds to 120 seconds. The shortest cycle times can allow minimized heat storage bed size and improved temperature uniformity, while longer times reduce the amount of wear and tear on the cycling components.

Figure 1



Bloom Engineering conducted a research and development effort in order to address the problem of high NO_X emissions from Regenerative burners. The Bloom LumiFlame™ burner design shown conceptually in Figure 2 provides an example of an Ultra Low NOx burner.

Figure 2 LumiFlame Ultra Low NO_X Concept



The concept of internal furnace POC (products of combustion) recirculation into the root of the flame for NO_X reduction is well known. However, until recently the NO_X levels achieved using this technique with Regenerative air preheat levels remained excessive. EGR was therefore required in most cases. Bloom employed its R&D facilities in a combination of laboratory-scale burner testing and Computational Fluid Dynamics (CFD) modeling to study the problem and optimize burner design and performance. CFD was also utilized to study the impact of burner design on flame heat transfer characteristics, to insure that the resulting designs would produce flames suitable for aluminum melting applications.

Key Design Characteristics of the LumiFlame Burner Include:

1) A simple, rugged high alumina "baffle" which is used to create the necessary air and fuel flow jet patterns for ultra low NO_X emissions, as well as providing support for the fuel nozzle and shielding the burner internals from furnace radiation.

2) "First stage" air port, used to provide stable operation at furnace temperatures below 980°C. Air is fed to this port to provide cold start and low temperature batch furnace modes, while still achieving extremely low NO_X and good efficiency. Figure 3 illustrates the efficiency of LumiFlame Regenerative burners compared with cold air combustion.

3) Unique High Luminosity/High Heat Transfer flames on gas or fuel oil operation.

4) Adjustable directivity, to optimize the flame for various furnace types. For example, flames can be directed toward the aluminum bath of a sidewell melter, without the problem of excessive burner velocity (which can lead to excessive dross formation by constantly exposing fresh metal). The luminous, medium velocity flame pattern is similar to previous versions of Bloom melting furnace burners.

5) The oxidizing medium (in this case high-preheated air) shrouds the fuel, such that contact between reducing atmosphere gases and product to be heated is minimized.

6) Exhaust Gas Recirculation equipment is not employed. Essentially, the "vitiation" effect of EGR is accomplished using the internal burner/port geometry.

The widespread adoption of PLC control systems is making it easier than ever for plants to install and maintain the type of controls needed for Regenerative burner systems. PID loop control, cycle-valve switching, alarming, trending, start-up/shutdown and trouble-shooting functions can now be incorporated into PLC/HMI equipment. The number and type of devices, which the electrical maintenance personnel must handle, is significantly reduced versus earlier systems.

In addition to the Ultra Low NO_X burner development program, Bloom has addressed other major drawbacks of previous Regenerative burner systems as well. For aluminum melter applications with salt fluxing, the Bloom Regenerative media beds can be provided with either a hinged easy-open cleanout door or completely removable media case (with compression-type, no-bolt, quick connector option). In either case, a spare amount of media on hand allows quick replacement and minimal burner downtime. The contaminated media is then cleaned off-line and can be reused many times.

Our maintenance history experience shows that concerns about high maintenance costs are unfounded (for direct-fired Regenerative systems). Spare parts for maintenance have typically averaged only about 2-4% of system initial cost per year, covering all burner and cycle valve hardware.

Performance

As shown in Figures 3 and 4, the Bloom LumiFlame concept employing High Internal POC Recirculation produces extremely low NO_X emissions, while maintaining high combustion efficiency.

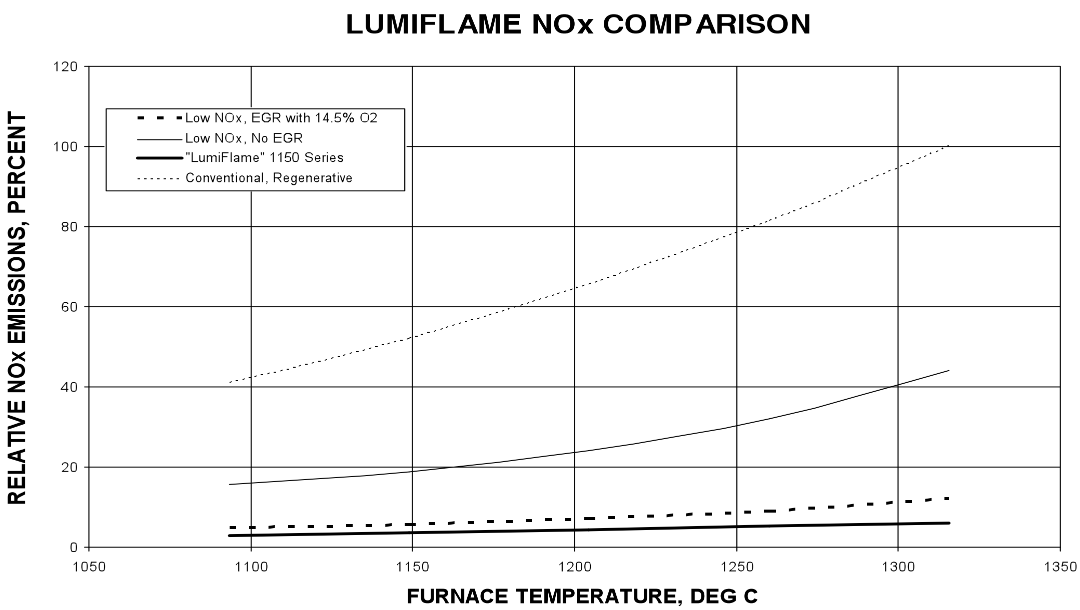


Figure 3

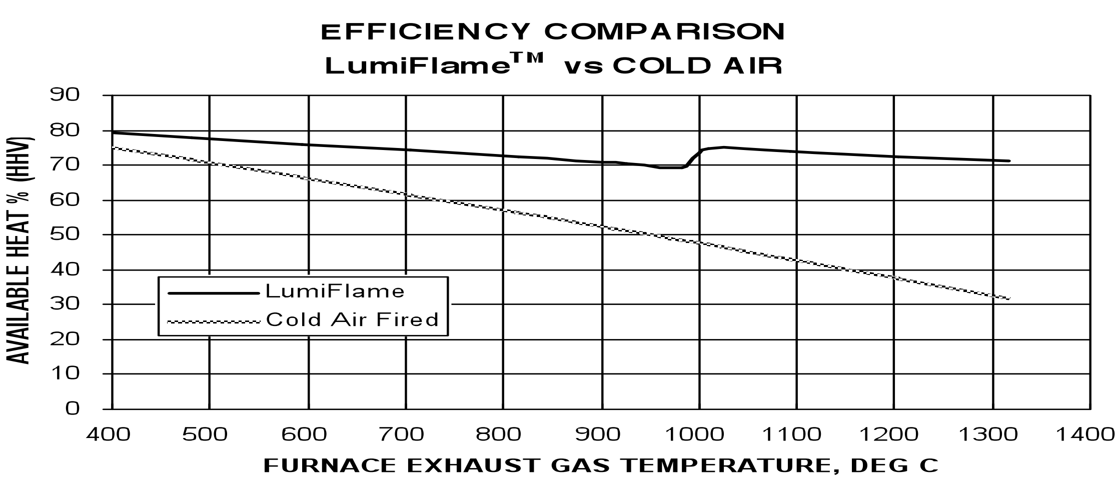


Figure 4

Other “Low NO_X technologies” such as oxy-fuel or POC post-treatment have significant practical drawbacks in aluminum melter applications. For example, while pure O_2/CH_4 mixtures would produce zero NO_X emissions, nitrogen (N_2) will enter the process via the fuel, as well as tramp air into the furnace chamber in most real-world systems. Furthermore, the cost for oxygen must be factored in to any comparison with Regenerative firing. Table 1 illustrates that oxy-fuel operating costs are more than double those of Regenerative systems.

Operating Cost Comparison Per Hour For 10 MM BTU/hr (2.52 x 10^6 Kcal/hr) Net Heat Input to Furnace

	Cold Air	Recuperative 500°C Preheat	Regenerative	Oxy Fuel
Equivalent Burner Input (10^6Kcal/Hr)	8.09	5.27	3.54	3.54
Natural Gas (NM^3)	909	594	399	399
Fuel Cost ($)	192.40	125.80	84.40	84.40
Oxygen (NM^3)	-	-	-	913
Oxygen Cost ($)	-	-	-	80.52
Electrical Cost for Blowers ($)	1.97	2.67	2.74	-
Total Cost/Hr ($)	194.37	128.47	87.14	164.92

Table 1

Basis:

- Efficiencies calculated on furnace exhaust gas temperature of 1300°C
- Fuel Cost $6.0/MM BTU
- Oxygen Cost $0.25/ccf (liquid oxygen)
- Electricity Cost $0.075/kWh

Since oxygen production itself consumes substantial energy, the cost comparison results are unlikely to change for the foreseeable future. The net environmental ‘benefit’ of reduced CO2 and NOx reduction is also questionable when the electric power generation required for oxygen production is factored in.

Catalytic or other post-treatment systems typically require specific reaction temperature windows, which are difficult to achieve continuously on process furnaces such as aluminum melters. We are currently unaware of any domestic industrial melting furnaces utilizing a post-treatment NO_X suppression system for the POC gases.

Carbon monoxide (CO) emissions from a properly tuned conventional combustion system are generally below 50 ppmv (corrected to 3% O2). Field data from several installations have confirmed that the Bloom LumiFlame system produces significantly less than 50 ppmv even at low excess air levels.

Carbon dioxide (CO_2) is emitted in direct proportion to the amount of fuel consumed for hydrocarbon fuels. Since Regenerative firing results in the highest available combustion efficiencies, CO_2 emissions are dramatically reduced, as illustrated in Table 2:

Efficiency and CO_2 Emissions
Basis: 1300°C Furnace Exhaust Gas Temperature, Natural Gas Fuel

Type of System	Air Preheat Temp °C	% Available Heat-HHV	kg CO_2 Emitted per kcal x 10^6 Net to Process
Cold Air	21	32	675
Recuperative	500	49	440
Regenerative	1130	71	300

Table 2

Another area of advantage for Regenerative systems on aluminum melting furnaces is that the regenerator media acts as a filter of POC particulates, such as salt fines and dross particles. By filtering and returning much of this material to the furnace, particulate emissions are significantly reduced compared to conventional burner systems. Furthermore, the POC exhaust volume and temperature is much lower than conventional systems, so that in the event that baghouse collection were required, its size would be only a fraction of that needed when using cold air or recuperative systems. For retrofit situations in which a production increase is desired, Regenerative burners are often an attractive alternative to enlargement of the exhaust ducting and flue system.

Applications

Aluminum Melting

Scrap remelting and recycling furnaces are generally good candidates for Regenerative combustion systems. The economics of applying Regenerative burners should be evaluated when planning new furnaces or modifications to existing combustion systems. Productivity increases can often be achieved via the proper application of Regenerative burners. The LumiFlame system has been proven to provide excellent melt rates while maintaining its low NO_X emissions over a wide range of design chamber temperatures. Specific fuel rates with Regenerative systems typically are below 1000 BTU/lb-HHV (505 kcal/kg-LHV). Proper attention to burner placement is key to achieving the desired melt rate and efficiency goals. CFD studies can be a useful tool for this evaluation, as illustrated in figure 5.

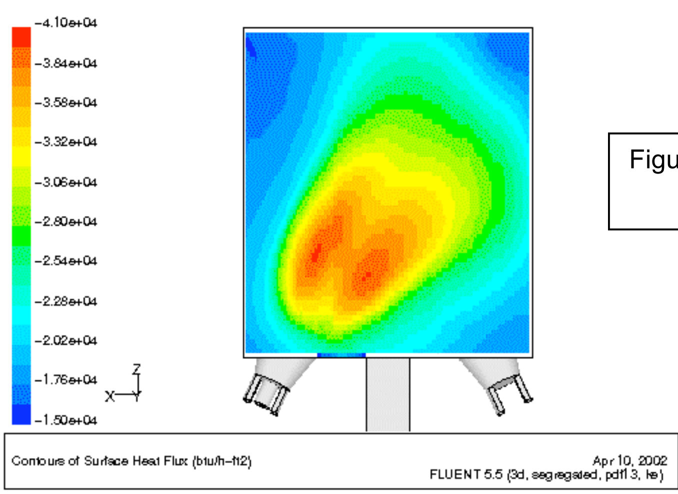


Figure 5

As we have seen, the recent advances in Ultra Low NO_X Regenerative Burner Systems have eliminated or reduced nearly all of the perceived drawbacks for aluminum melter applications. The initial system costs can be quickly recovered in most cases due to reduced operating (fuel) costs, and the environmental benefits provide further justification for this technology.

Continuous Steel Reheating Furnaces

Regenerative burners require a unique set of application guidelines. A Regeneratively fired furnace is designed and operated significantly different than a conventionally fired hot air furnace. That said, given the proper application, a Regenerative furnace can be a highly efficient, very reliable alternative to conventional combustion.

Regenerative burners are typically installed for side firing. The Regenerative processes of reversing combustion, is ideally suited for side wall firing, and results in excellent uniformity across the width of the furnace. Spacing of the burners along the side walls should be addressed particularly in bottom zones of walking beam furnaces. Great care should be taken to place the burners in open firing aisles, to prevent flame disruption which can cause increase in NOx production, as well as physical damage to the skid system. Examples of burner placement studies and resulting expected uniformity are shown in figures 6 and 7.

Burner control typically limits burner turndown to approximately 25 – 30% capacity to prevent flame lift, as well as maintaining proper temperature distribution across the furnace width. With the PLC control, burners can be "cascaded" on and off to optimize furnace efficiency and minimize NOx production.

Regenerative side firing on a steel slab heating furnace

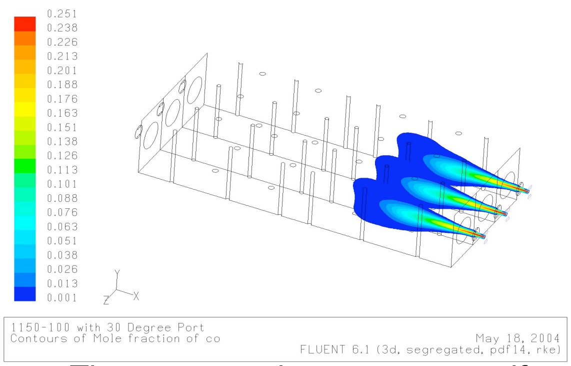


Figure 6

Time-averaged temperature uniformity (CFD model)

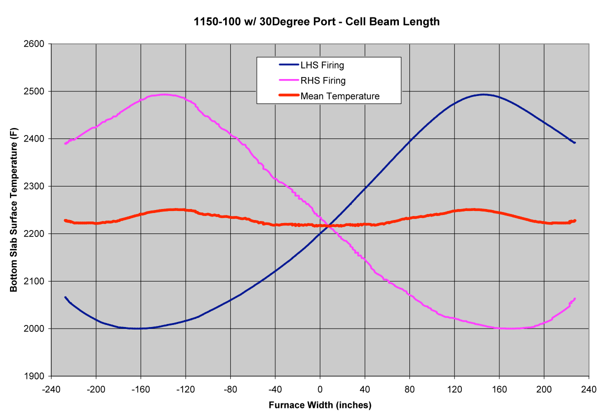


Figure 7

Fuel consumption of about 1.0 mmBTU/Short ton-HHV (0.25 kcal/mton LHV) on cold-charged product is achievable with Regenerative firing. Admittedly it is possible to build a 'conventional' continuous reheat furnace which can approach this level, but this requires a significantly longer furnace and high-performance recuperator. In many cases the Regenerative option is cost-competitive and can provide higher productivity for a given furnace length. For the same reasons, Regenerative 'booster' zones can be an attractive option for increasing the productivity while improving the efficiency of existing furnaces.

The LumiFlame system can operate with a variety of typical steel mill fuels, including coke oven gas, mixed COG/BFG, light and heavy fuel oils, while achieving excellent low-emission performance.

Batch-type steel heating furnaces

Forging and other high-temperature heating processes can achieve dramatic efficiency gains by switching to Regenerative burners. Often the batch-type furnace will have a flue gas temperature exceeding 1200 C. As seen in figure 3, this would result in a fuel savings of 47% compared with cold-air firing. The added equipment cost may be partially offset because of the temperature uniformity benefits of the cyclic Regenerative firing, thus allowing a reduction in the number of burners required. The results of a recent CFD study illustrate in figure 9 how burner placement can be optimized on a batch-type soaking pit used for specialty steel forging.

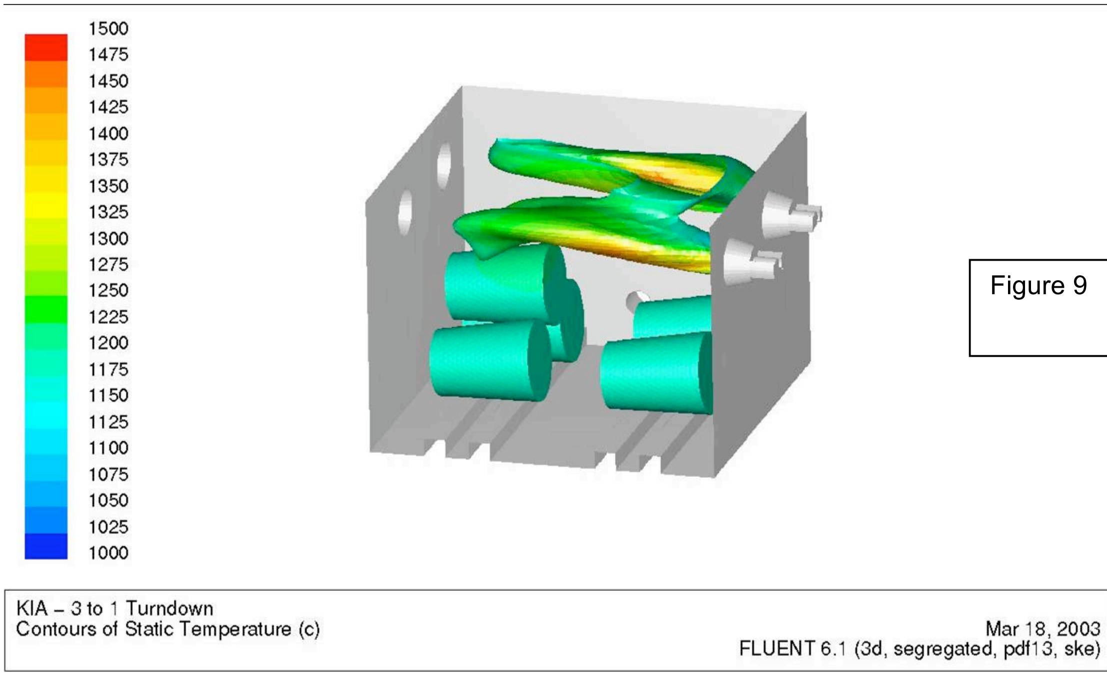


Figure 9

Specialty Indirect-type Heating

Indirect heating, in which the products of combustion do not come in contact with the product is used in numerous industrial processes, such as steel strip heating (continuous or batch), tube heat-treating, galvanizing and specialty glass melting. The combustion can occur in radiant tubes or in a combustion chamber surrounding a muffle or crucible containing the product being heated. Such processes are often thermally inefficient due to the difficulty in obtaining high heat-transfer rates. Regenerative burners have been applied to decrease the energy required for such processes. The economics of any particular application depend on the process operating parameters. We would recommend that Regenerative burners be considered for applications in which the exhaust gas temperature exceeds about 900 ^{o}C.

Conclusion

Modern Regenerative combustion systems have been successfully applied in hundreds of applications around the world on a wide variety of industrial heating processes. The efficiency and environmental benefits are well-documented, and the maintenance concerns and other perceived drawbacks have been largely overcome with the latest available system designs. With economic payback times often in the range of 1-2 years based on fuel savings, we believe that Regenerative combustion systems should be the design of choice for a wide variety of high temperature industrial heating processes. So, in many cases the clear answer is YES, Regenerative burners are ‘Worth It’.

From: Ryan Barth [mailto:rbarth@anchorenv.com]
To: Turk, Wayne
CC: Capex Group; Ryan Barth
Sent: 2007, 07.10 Tue, 22:29:13
Subject: Tacchi Boring Info

Attachments:
MW-16_ MW-18_ and MW-30.pdf
GW Monitoring Well Locations.pdf

As per our discussion yesterday, I have located the boring logs for MW-16, MW-17 and MW-30 in the general vicinity of the potential Tacchi location – see attached.

Since monitoring of MW-30 was initiated in 1999, no product (i.e., hollobore oil) has been identified in MW-30. Depth to groundwater over the last few years at this location has ranged from 10 to 12 ft. Alternatively, since 1992 the depth below ground surface to product at MW-16 has ranged from approximately 9.5 to 11.4 ft and since 1999 the depth to product at MW-17 has ranged from approximately 10.2 to 11.2 ft. Depth to groundwater over the last few years has ranged from 15 to 18 ft and 14 to 16 ft for MW-16 and MW-17, respectively.

I am going to forward the boring logs on to John Verduin (here at Anchor) to get his thoughts on whether sufficient info is present in the logs (limited depth so I suspect not) to support the foundation design. As time permits please email me the current loading info for the Tacchi so I can also forward that to John to help him make this assessment.

Thanks.

Ryan Barth, P.E.
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From: Jay.Willenberg@CH2M.com
To: Luce, Chuck
Sent: 2008, 09.23 Tue, 18:06:58
Subject: Test Results

Attachments:
Jorgensen Furn test.xls

Chuck

Most of the test report is just fine. The calculations on concentration look OK, they just show that you are over the limit.

I can't follow the calculations on flow or lb/MMBtu (lb/1000 therms). Attached are my calculations. It looks like about 40% of the exhaust when out the preheater stack and the rest out the East or West stacks. I also think that the emission rate should be about 0.1 lb/MMBtu or 0.2 lb/hr. I'm having someone check my calculations.

Jay